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ABSTRACT

This volume of working papers includes seven papers discussing current theory and research in linguistics, phonetics, semantics, and syntax. The following titles are in the collection: "'Do' from 'Occur'," "The Syntax of the Verb 'Happen'," "Subjects and Agents," "Modal Auxiliaries in Infinitive Clauses in English," "Some Problems in the Description of English Accentuation," "Some Observations Concerning the Third Tone in Latvian," "On the Syntax and Semantics of English Modals." Titles appearing in the first and second volumes of the working papers are listed. (VM)

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WORKING PAPERS IN LINGUISTICS, No. 3

by

Dale E. Elliott, Shuan-fan Huang,
D. Terence Langendoen, P. Gregory Lee
and Ilse Lehiste

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June, 1969

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The Ohio State University
Columbus, Ohio 43210

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FOREWORD

The Computer and Information Science Research Center of The Ohio State University is an inter-disciplinary research organization which consists of the staff, graduate students, and faculty of many University departments and laboratories. This report presents research accomplished in cooperation with the Department of Linguistics.

The work of the Center is largely supported by government contracts and grants. The research which led to this report was partly supported by the Office of Science Information Service, National Science Foundation under Grant No. GN-534.

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List of WORKING PAPERS IN LINGUISTICS

No. 1

"The Grammar of HITTING and Breaking," Charles J. Fillmore, pp. 9-29. (To appear in Studies in English Transformational Grammar, R. Jacobs and P. Rosenbaum, eds., Ginn-Blaisdell, 1969.)

"The English Preposition WITH," P. Gregory Lee, pp. 30-79.

"Relative Clauses and Conjunctions," Sandra Annear, pp. 80-99.

"On Selection, Projection, Meaning, and Semantic Content," D. Terence Langendoen, pp. 100-109.

"Some Problems of Derivational Morphology," Sandra Annear and Dale Elliott, pp. 110-115.

"The Accessibility of Deep (Semantic) Structures," D. Terence Langendoen, pp. 118-127. (To appear in Studies in English Transformational Grammar, R. Jacobs and P. Rosenbaum, eds., Ginn-Blaisdell, 1969.)

"Review of Haim Gaifman, 'Dependency Systems and Phrase-Structure Systems,' Information and Control 8 (1965), pp. 304-337," James T. Heringer, pp. 128-136.

"Diphthongs Versus Vowel Sequences in Estonian," Ilse Lehiste, pp. 138-148. (To appear in the Proceedings of the VI International Congress of Phonetic Sciences, Prague, 1967.)

No. 2

"Lexical Entries for Verbs," Charles J. Fillmore, pp. 1-29. (Also in Foundations of Language 4 (1968), pp. 373-393.

"Review of Componential Analysis of General Vocabulary: The Semantic Structure of a Set of Verbs in English, Hindi, and Japanese, Part II, by Edward Herman Bendix. I.J.A.L. Vol. 32, No. 2, Publication 41, 1966," Charles J. Fillmore, pp. 30-64. (Also in General Linguistics 9.41-65 (1969))

"Types of Lexical Information," Charles J. Fillmore, pp. 65-103. (To appear in Semantics; An Interdisciplinary Reader in Philosophy, Linguistics, Anthropology and Psychology, Jacobovits and Steinberg, eds., Cambridge University Press; and Proceedings of the Balatonszabadi Conference on Mathematical Linguistics, Kiefer, ed., D. Reidel.)

"'Being' and 'Having' in Estonian," Ilse Lehiste, pp. 104-128. (To appear in Foundations of Language.)

INTRODUCTION

Two papers in Working Papers in Linguistics No. 3 are on accent; the others deal with the following topics in English syntactico-lexicologico-semantics: modals, deletable verbs, and *by*-clauses. Immediate connections with other current research are of course noted in the papers themselves, but some more remote connections will be pointed out here, with particular reference to work done by our staff. If anyone is doing research related to any of the matters we are concerned with, we hope you will find time to write us about it. We are grateful to those who have helped us by criticizing papers in the preceding numbers of Working Papers.

One of the papers on accent is Lehiste's "Some observations concerning the third tone in Latvian," which contains, in addition to an analysis of the third tone, some data on Danish stød. She raises the issue of whether a universal theory of phonetics should identify the third tone and stød, in light of the facts she presents. The other paper on accent is Langendoen's "Some problems in the description of English accentuation." He proposes rules to express various generalizations about English stress patterns. Lee is also working in this area; see his paper "English word-stress."[1] Charles Fillmore is currently working on accent in Japanese dialects.

Two papers are concerned with the analysis of English modals. Huang's "On the syntax and semantics of English modals" collects and analyzes a number of interesting facts about the modals, expecially *may*. In "Modal auxiliaries in infinitive clauses in English", Langendoen shows that an output condition is required to exclude modals from infinitive clauses.

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[1] To appear in Papers from the Fifth Regional Meeting of the Chicago Linguistic Society, University of Chicago, 1969.

The verbs *occur* and *happen* are studied in Lee's paper "*Do* from *occur*", and in the paper by Elliott, "The syntax of the verb *happen*." Lee shows that it is useful to regard the two deletable verbs *do* and *occur* as different manifestations of a single verb. The framework assumed, in which the verb comes first in the underlying representation, was suggested by Charles Fillmore's work on case grammar[2] and by James McCawley's lectures at the 1968 Linguistic Institute at the University of Illinois.

Elliott shows that there are two verbs *happen*, one of which means 'chance'; the other behaves similarly to *occur* except that it takes an optional malefactive complement. Richard Russell also discussed malefactives in his work on Amahuaca.[3]

Lee's " ubjects and agents" is primarily an investigation of constructions he calls *by*-clauses, which have been largely neglected by traditional English grammarians. The passive *by*-clauses discussed in section 5 provide some evidence that the usual formulation of the passive transformation as moving an object into subject position is essentially correct. Otherwise the identity condition discussed would be difficult to state. This is contrary to several recent proposals; see for example Hasegawa's article "The passive construction in English."[4]

---

[2] See for example his papers in numbers 1 and 2 of *Working Papers*.

[3] *A transformational analysis of Amahuaca*, OSU M.A. thesis 1965.

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[4] Language, June, 1968, pp. 230-244.

Do from Occur*

P. Gregory Lee

---

*Sponsored in part by the National Science Foundation through Grant GN-534.1 from the Office of Science Information Service to the Computer and Information Science Research Center, The Ohio State University.

Do from Occur

1. The verbs break and begin have surface transitive and intransitive uses.

(1) transitive: Harry broke John's leg
intransitive: John's leg broke
transitive: John began to work
intransitive: The faucet's dripping began

It has been shown by Fillmore[1] and Perlmutter[2] that these two verbs (and the classes of verbs they represent) also have underlying transitive and intransitive uses, but that deep structure intransitive may become transitive in surface structure. Diagrammatically:

(2)
$$\begin{tikzcd} \text{underlying:} & \text{transitive} \arrow[d] & \text{intransitive} \arrow[d] \arrow[dl] \\ \text{surface:} & \text{transitive} & \text{intransitive} \end{tikzcd}$$

I will show that occur is like break and begin in this respect with, however, two complications. Occur can be deleted, and its surface transitive form is do.

First, to provide a framework for the discussion of occur, a brief restatement of the analyses of break and begin is in order. Assume that there is a phrase structure rule which expands S into a verb plus a number of noun phrases (S→V NP*). A corollary of this assumption is that there is a "subject formation rule." I will use the following version:[3]

(3) Subject formation:

$$\begin{array}{llll} & [_{S}V, & NP & \rightarrow \\ & 1 & 2 & \\ 2\ \text{ch} & 1 & \emptyset & \end{array}$$

where 2 ch 1 means Chomsky-adjoin 2 at the left of 1.

---

[1] Fillmore (1968a, b).

[2] Perlmutter (1968).

---

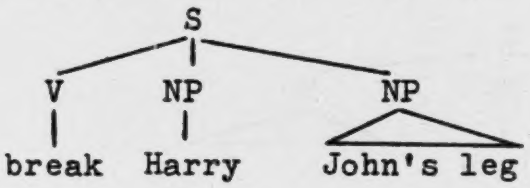
[3] Variables (which may include brackets) on either side of the structural description and change are understood. The bracket $[_S$ represents the S node to which the NP is Chomsky-adjoined.

---

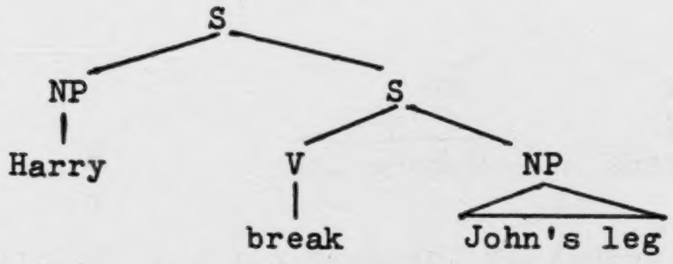
2. Break

As an example take the derivation of Harry broke John's leg. The deep structure (DS) is (4); subject formation applies to (4) to give the surface structure (5).

(4)

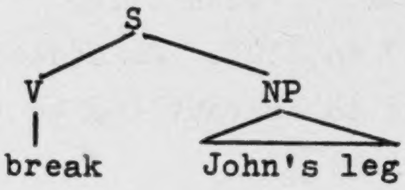


→ (5)

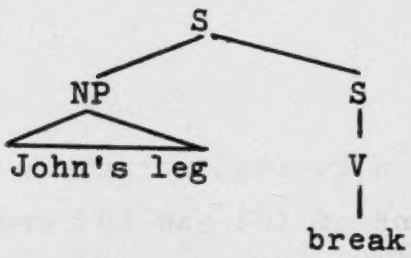


(4) exemplifies the underlying transitive use of break, (5) exemplifies the surface transitive use. (In these terms "transitive" obviously doesn't mean quite the same thing as applied to deep and surface structure.) We get the deep and surface intransitive uses of break in John's leg broke.

(6)

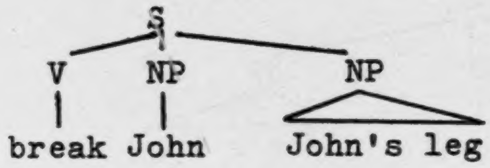


→ (7)

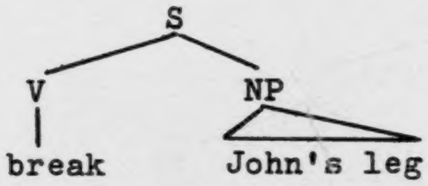


The sentence John broke his leg shows the crossover from underlying intransitive to surface transitive. John broke his leg has two senses, agentive and non-agentive. In the agentive sense, John was responsible for his leg's getting broken; in the non-agentive sense it was something that just happened to John. In the agentive sense then, *John broke his leg* is understood the same way as *Harry broke John's leg,* except for the identity of the leg-breaker. In the non-agentive sense, *John broke his leg* is a paraphrase of *John's leg broke*. These facts are adequately accounted for if we give *John broke his leg* the two different DS's (8), DS transitive, and (9), DS intransitive, corresponding to the agentive and non-agentive senses, respectively.

(8)

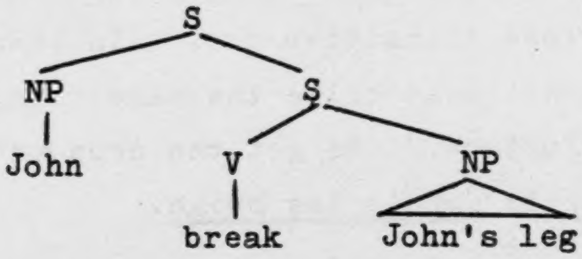


(9)



DS's (8) and (9) result in the same surface structure, namely (10)

(10)



Subject-formation changes (8) to (10). An additional rule, genitive-raising, is required to convert (9) to (10).

(11) Genitive-raising:

V, $[_{NP}$, NP, 's →

1 2 3 4

1 + 3 2 3 4

Genitive-raising changes (9) to a derived structure identical with the DS (8). The derivations of (8) and (9) are then merged, and subject-formation gives (10) for both.

3. *Begin*

Begin works similarly. As was shown by Perlmutter (1968) *begin* occurs as both an underlying transitive and an underlying intransitive, and the underlying intransitive may become a surface transitive. Again, the underlying transitive is agentive, the underlying intransitive non-agentive. The non-agentive interpretation is the only possible one if the surface subject is inanimate.

(12) The faucet began to drip (=The faucet's dripping began)

(13) It began to rain

On the other hand, (14) is agentive, while (15) is ambiguously agentive or non-agentive.

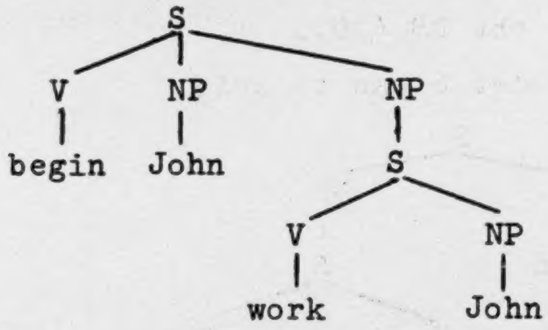
(14) John carefully began to unscrew the faucet.

(15) John began to lapse into the vernacular.

The details of the derivations of agentive and non-agentive *begin* are then as follows. As an example of the agentive, deep structure transitive *begin* take the sentence (16), whose DS is (17).

(16) John began to work.

(17)



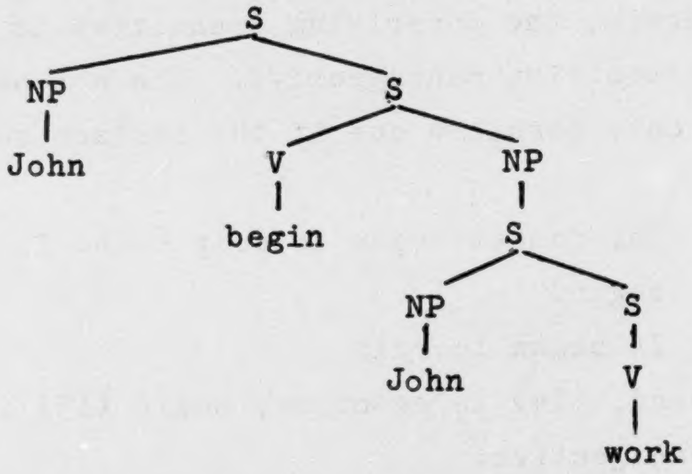
Applied cyclically to (17), subject-formation gives the derived structure (18)[4].

---

[4] The NP over S which is the object complement of *begin* does not undergo pronominalization, no matter whether *begin* is agentive or non-agentive. There are marginal sentences like *John began to work, and he began it right away*, but this from *John began to work, and he began to do it right away* with *to do*

deleted. That is, the *it* (in other instances *the job*, *the task*) shows the presence of a NP, but the NP is a complement of *do*, not *begin*.

→ (18)

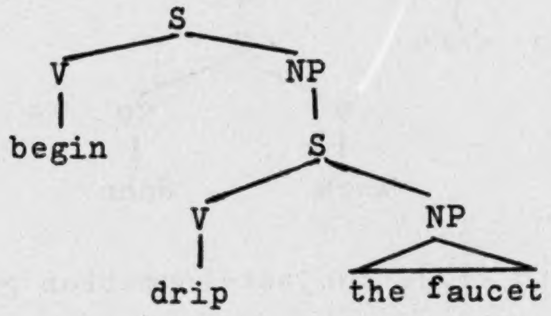

S
NP
John
S
V
begin
NP
S
NP
John
S
V
work

(18) is converted to *John began to work* by familiar rules--complementizer placement and identity erasure.[5]

As an example of the non-agentive, underlying intransitive *begin* take (19), with the DS (20).

(19) The faucet began to drip.

(20)


S
V
begin
NP
S
V
drip
NP
the faucet

Subject-formation applies to the lower S in (20) to give (21).

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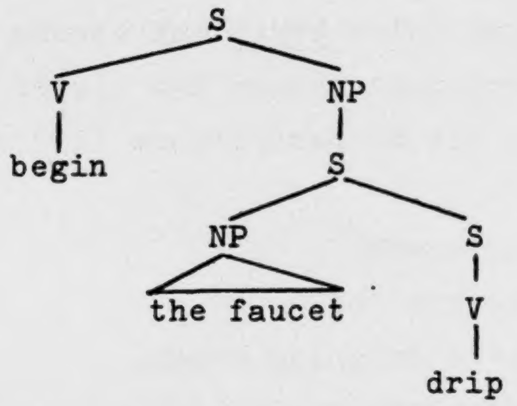
[5] Rosenbaum (1967).

→ (21)


S
V
NP
begin
S
NP
S
the faucet
V
drip

Subject-formation can then apply to the higher S, resulting in The faucet's dripping began. However, to get (19), we need a new rule, subject-raising.

(22) Subject-raising:

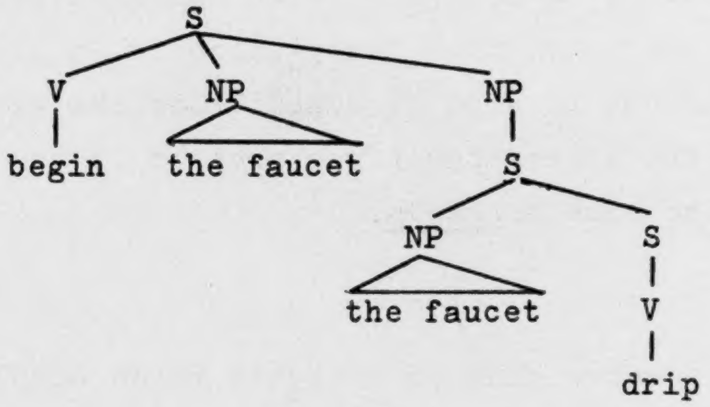
$V,\ [_{NP}\ [_{S},\ NP \rightarrow$

1 2 3

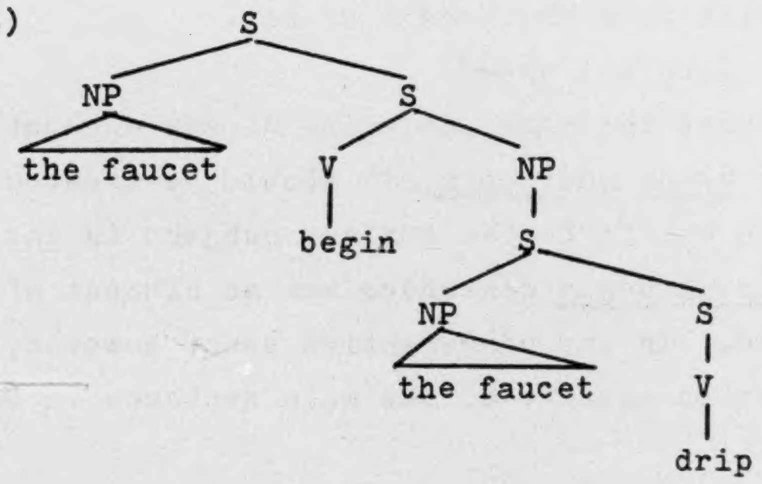
1 + 3 2 3

Subject-raising converts (21) to (23), which by subject-formation becomes (24).

→ (23)


S
V
NP
NP
begin
the faucet
S
NP
S
the faucet
V
drip

→ (24)


S
NP
S
the faucet
V
NP
begin
S
NP
S
the faucet
V
drip

As with _break_, intransitive _begin_ can become transitive by having its single NP complement become two sister NP's. This treatment accounts for a set of paraphrases (25) and a set of ambiguities (26).

(25) John's leg broke.
= John broke his leg.
The faucet's dripping began.
= The faucet began to drip.

(26) John broke his leg.
John began to lapse into the vernacular.

Since genitive-raising and subject-raising are copying transformations, we predict that in non-agentive interpretations the subject of transitive _break_ will be the same as the genitive modifying _break_'s object and that the subject of transitive _begin_ will be the same as the subject of its object complement. Of course, this is the case. This result doesn't seem to be a real economy in the case of _begin_, since transitive _begin_ obeys this restriction whether it is agentive or non-agentive. In the agentive case, however, this restriction is an accidental fact about _begin_, as can be seen by considering the verb _start_, which does not obey the like-subject restriction in the agentive but is otherwise the same as _begin_.

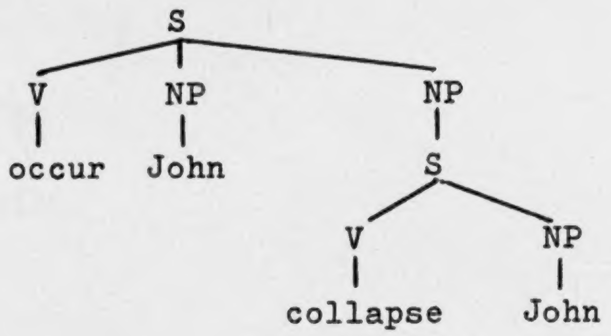
4. _Occur_

There is another kind of sentence which displays the agentive/non-agentive ambiguity. For example, in (27) John's action could have been deliberate or not.

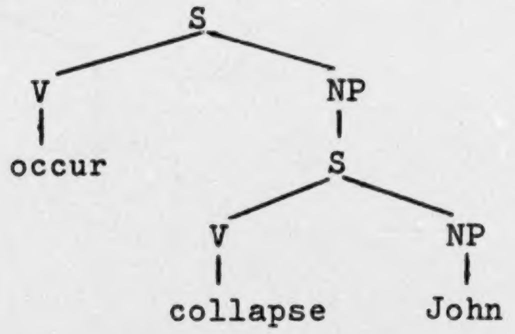
(27) John collapsed.

Since here we have the same ambiguity as was encountered in the sentences with _break_ and _begin_, it should be treated the same way. What came out to be the surface subject in the agentive sense of the _break/begin_ sentences was an element of the main sentences in DS. In the non-agentive sense however, the surface subject was not an element of the main sentence in DS, but was copied up into the main sentence from lower in the tree. The same should be true of sentence (27). In (27), however, there seems to be no "lower construction". I propose that the verb *occur*[6] is present in the two DS's corresponding to (27), and that the ambiguity of (27) can be accounted for the same way as the ambiguity of the *begin* sentences, with *occur* replacing *begin*. So the two DS's of (27) are (28) and (29).

(28) agentive:



(29) non-agentive:



(28) and (29) are converted to surface structures just like the sentences with *begin*. Later *occur* is deleted. For example, the steps in the derivation of *John collapsed* in the non-agentive sense are the following:

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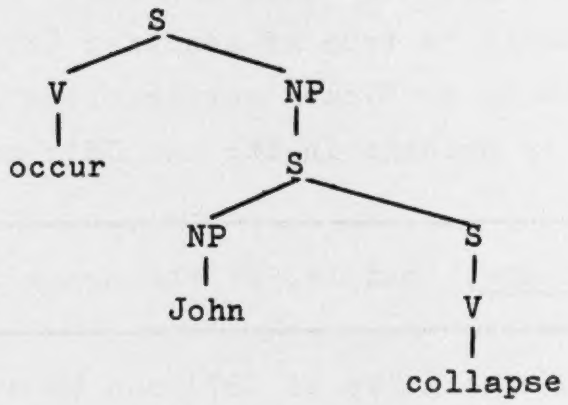
[6] *Occur*, that is, in the sense in which it means 'happen'.

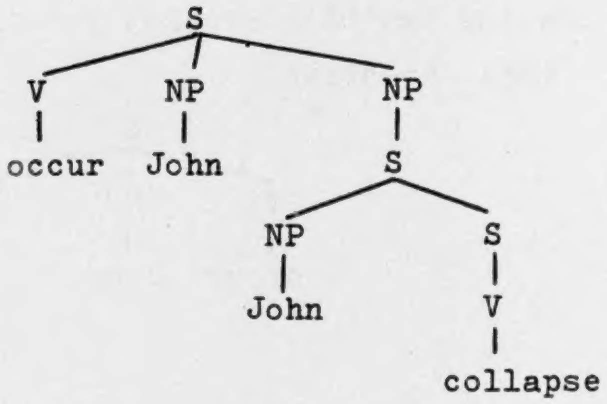
(29) → (30)

subject formation


S
V
NP
occur
S
NP
S
John
V
collapse

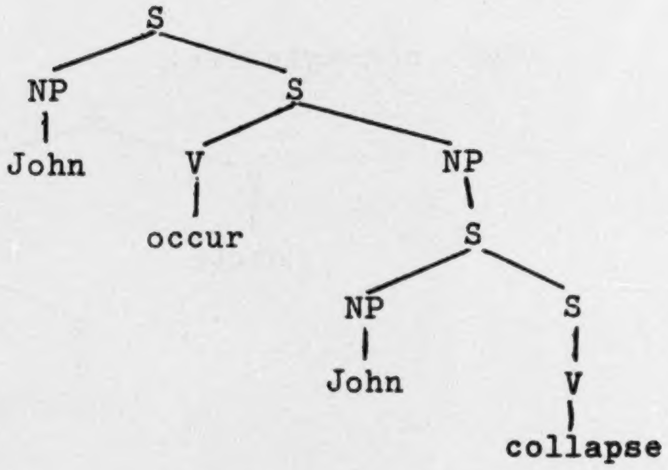
→ (31)

subject raising


S
V
NP
NP
occur
John
S
NP
S
John
V
collapse

→ (32)

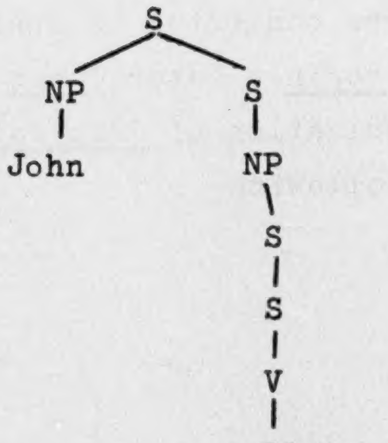
subject formation


S
NP
S
John
V
NP
occur
S
NP
S
John
V
collapse

→ (33)

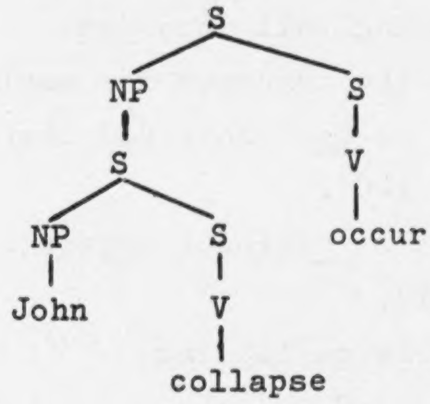
deletion of *occur*

(occur → $\emptyset$ / __NP)


S
NP
S
John
NP
S
S
V
collapse

As with *begin*, subject-raising need not apply, and (30) can become (34) by subject-formation.

(34) John's collapsing occurred.



So it is predicted that (34) is a paraphrase of *John collapsed* only in (34)'s non-agentive sense. This seems to me to be correct, although (34) is so awkward that it is hard to tell.

To show that *occur* is in fact present in the DS of *John collapsed*, consider the sentence frame *S, and I'm sorry that S.* The two S's must be the same, as is shown by (35)-(38).

(35) John collapsed, and I'm sorry that he collapsed.

(36) *John collapsed, and I'm sorry that Harry collapsed.

(37) *John collapsed, and I'm sorry that he picked the flower.

In (35) the *he* represents *John*, so on the underlying level, the S's are the same. But note (38).

(38) John collapsed, and I'm sorry that it occurred.

The *it* must represent the sentence *John collapsed* (dominated by an NP). For the S's to be the same, the first conjunct must contain *occur*, which has been deleted.

Note also that an agentive interpretation is possibly only with a non-stative[7] main verb, hence the agentive/non-agentive ambiguity only arises with non-stative verbs. Since a deletable occur is postulated to account for this ambiguity, it is a happy coincidence that occur requires a non-stative verb in its complement.

---

[7] Lakoff (1966a).

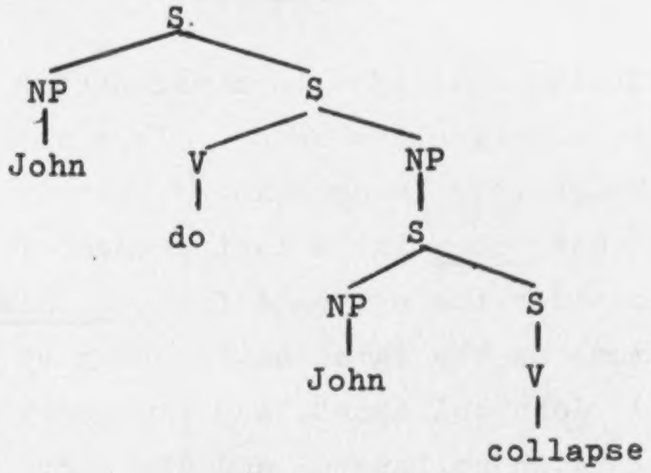
(39) *John's being tall occurred

Now let us consider the evidence for saying that the transitive form of occur is do. Note (a) that (32) is interpretable if there is a rule (40).

(40) occur → do / __ direct object

By (40), (32) becomes (41).

(41) John did his collapsing



(b) Do has the same restriction with respect to its object complement as occur has with its subject complement; the main verb of the complement must be non-stative.[8] If do is the transitive form of occur, the restriction need only be stated for occur.

(c) Both do and occur can be deleted without any change in meaning. In addition to (35) above, we have (42).

(42) John collapsed, and I'm sorry that he did it.

Do has been deleted from the first conjunct. The deletion of

---

[8] Lakoff and Ross (1966), Ross (1967).

do and *occur* can be expressed as one rule; if it takes place after (40), the rule is (43):

(43) $\text{do} \rightarrow \emptyset \; / \; \_\_ \; \text{V}$

(d) the surface form *do* occurs in both agentive and non-agentive sentences.

(44) agentive:
I told John to run, and he tried to do so.

(45) non-agentive:
It began to rain, and it did so all week.
What it did was (to) rain all week.

To account for this and to account for the appearance of the expletive *it* in (45) we must say that *do* has a deep structure intransitive form. Unless we are prepared to say that this form is *occur*, we must guarantee that this DS intransitive becomes transitive, since this *do* does not occur as a surface intransitive.

(e) The last piece of evidence is that the behavior of *do* with respect to "outer" locatives is a reflection of the behavior of *occur* and may be predicted from it. In (46) the locative *in the garden* is, in DS, a complement of *occur*.

(46) John collapsed in the garden.

If the *occur* had not been deleted, (46) would come out as (47).

(47) John's collapsing occurred in the garden.

As was noted, the subject complement of *occur* must have a non-stative main verb. So the unacceptability of (48) implies the unacceptability of (49).

(48) *John's being tall occurred in the garden

(49) *John was tall in the garden.

That *in the garden* is a complement of *occur* in the DS of (46) is also demonstrated by (50).

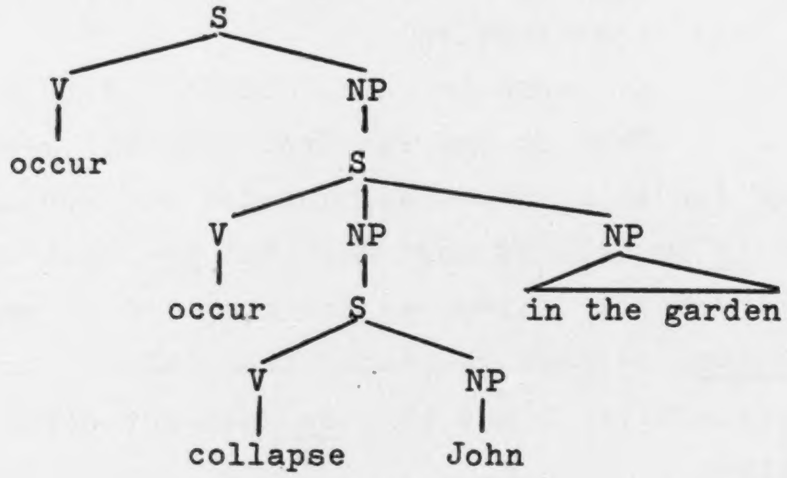
(50) John collapsed in the garden, and I'm sorry that
it occurred there.

Of course the *it* represents a NP dominating the sentence *John collapsed* and the *there* represents *in the garden*. But we also have (51), where the *it* represents *John collapsed in the garden*.

(51) John collapsed in the garden, and I'm sorry that it occurred.

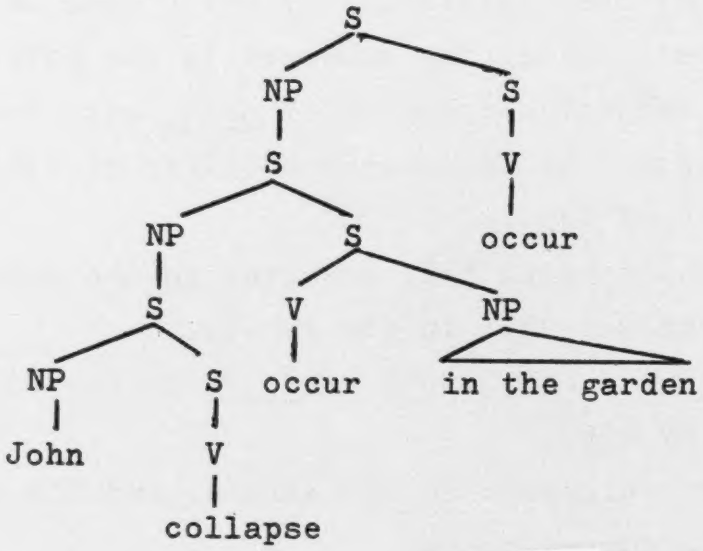
Therefore in the DS of (46) both *John collapsed* and *John collapsed in the garden* are subjects of *occur*; therefore there are two *occur*'s. That is, the DS of (46) is (52).

(52)


S
V
occur
NP
S
V
occur
NP
S
NP
in the garden
V
collapse
NP
John

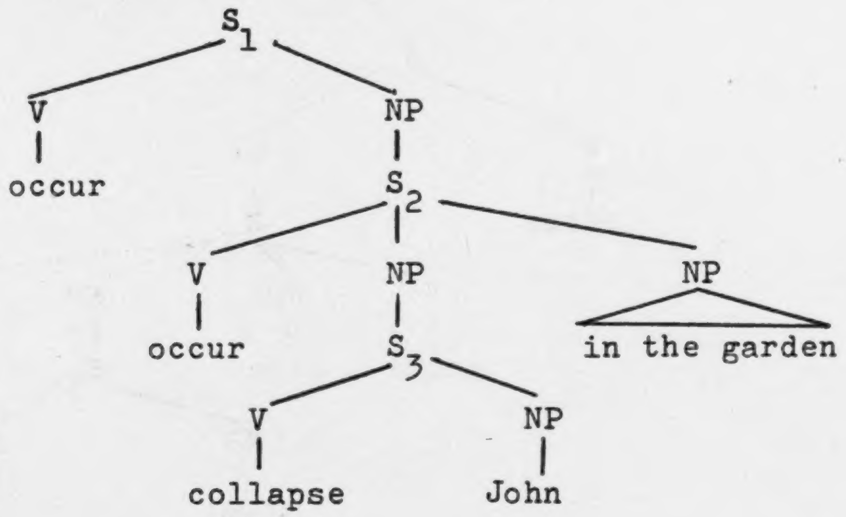
Applying cyclically to (52), subject-formation gives (53), which is an adequate basis for the different pronominalizations in (50, 51).

(53) John's collapsing's occurring in the garden occurred.


S
NP
S
S
V
occur
NP
S
V
NP
S
occur
in the garden
NP
John
S
V
collapse

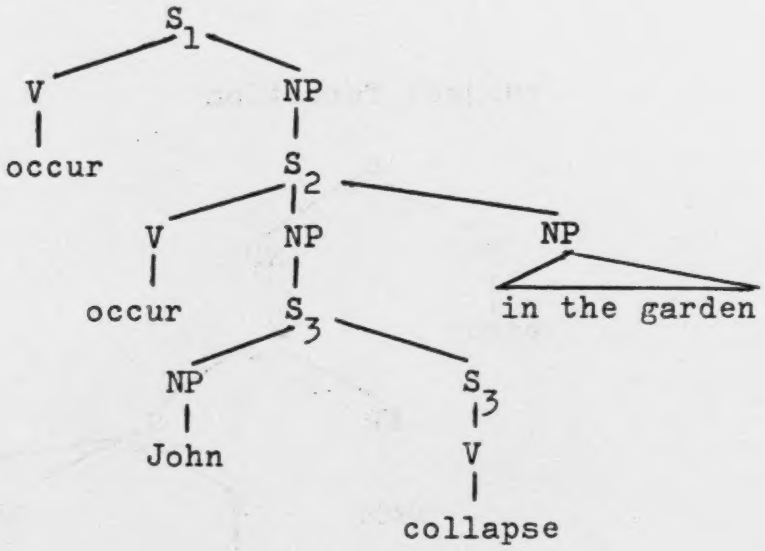
But now, suppose that subject-raising applies to (52) as well as subject formation. The rule (40) will also apply. The steps in the derivation are given in (54).

(54)


S1
V
NP
occur
S2
V
NP
NP
occur
S3
in the garden
V
NP
collapse
John

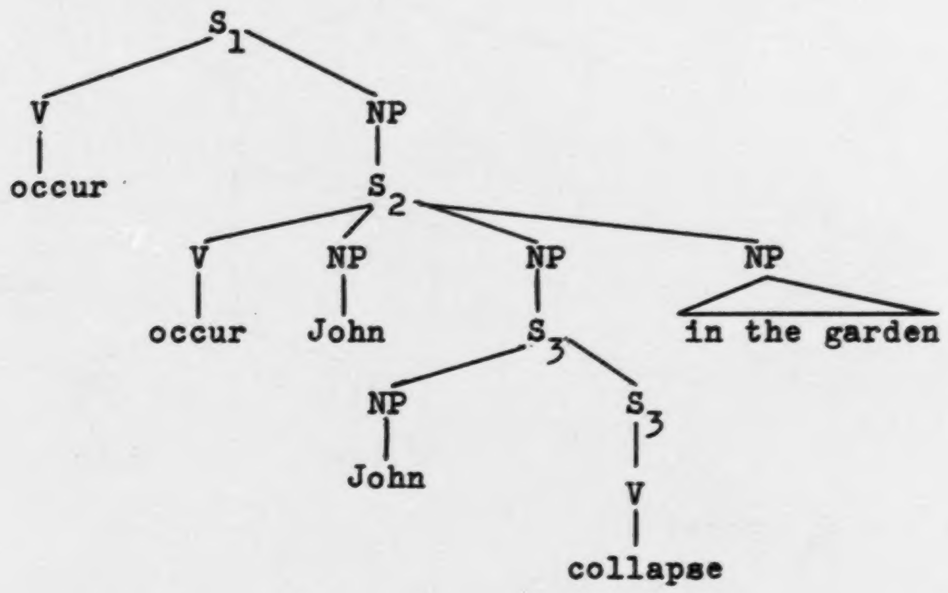
S_3 cycle:

subject formation:

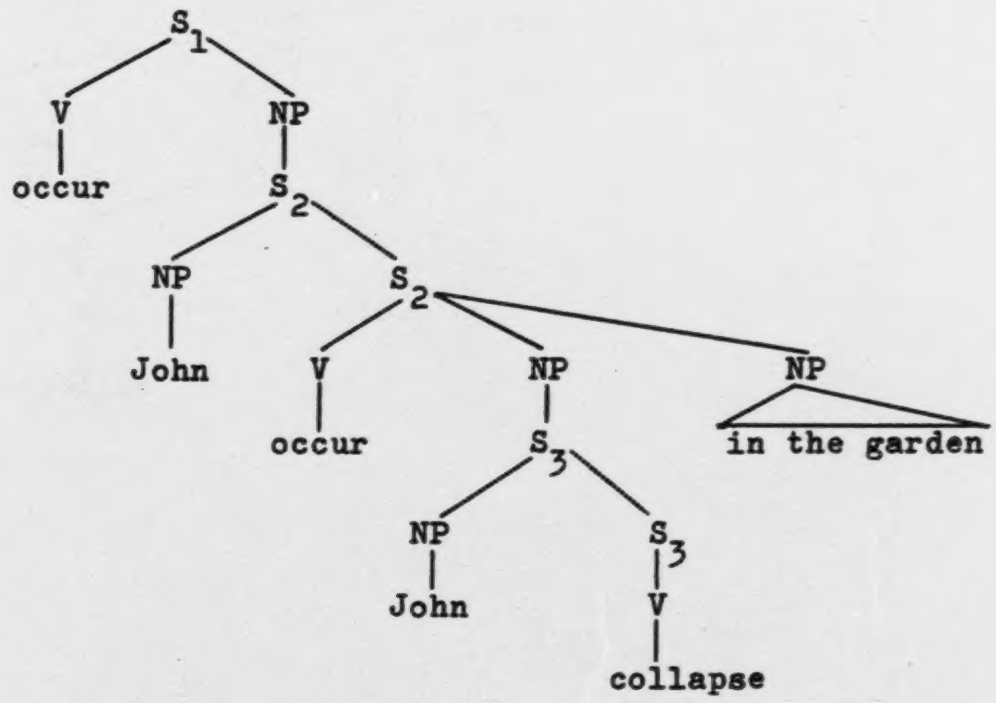

S1
V
NP
occur
S2
V
NP
NP
occur
S3
in the garden
NP
S3
John
V
collapse

S_2 cycle:

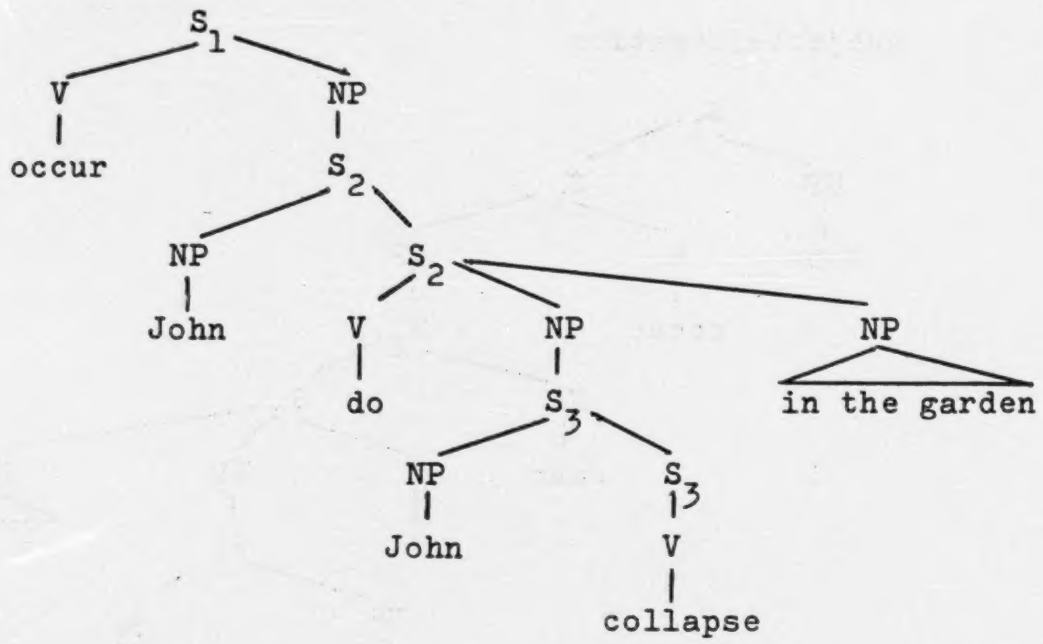
subject raising:


S1
V
occur
NP
S2
V
occur
NP
John
NP
S3
NP
John
S3
V
collapse
NP
in the garden

subject formation:

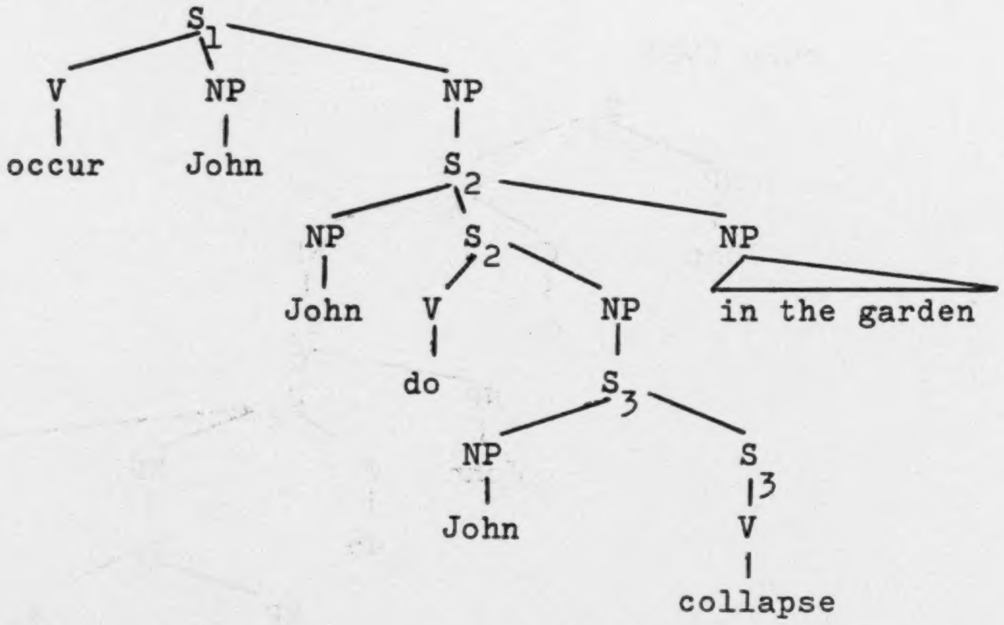

S1
V
occur
NP
S2
NP
John
S2
V
occur
NP
S3
NP
John
S3
V
collapse
NP
in the garden

rule (40):

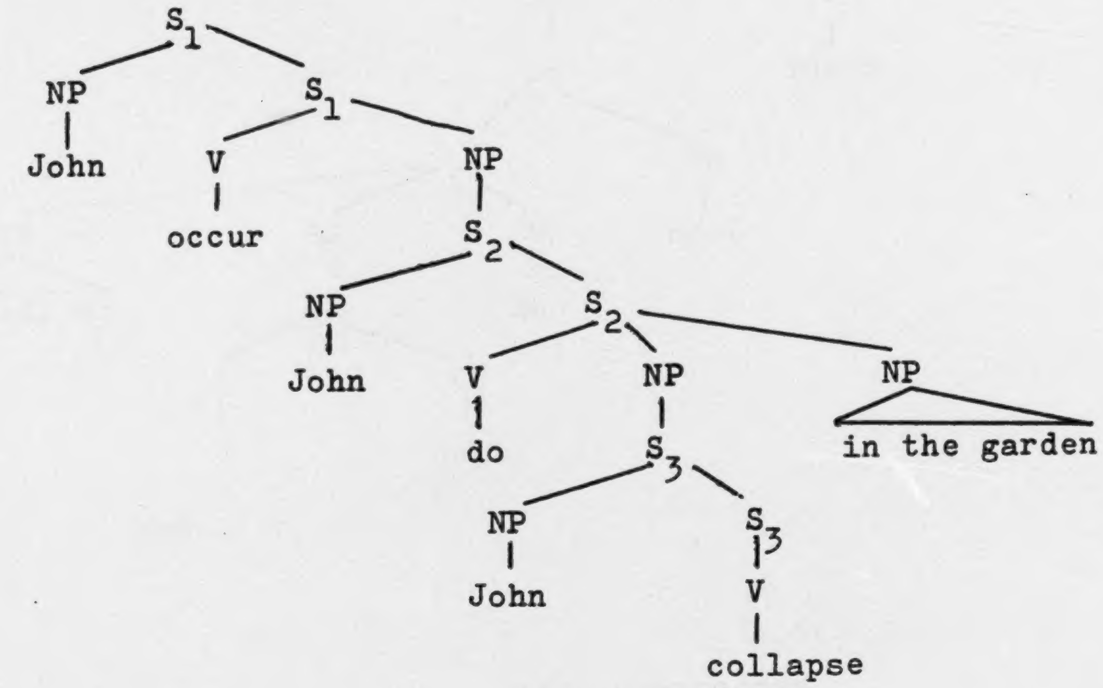

S1
V
NP
occur
S2
NP
S2
John
V
NP
NP
do
S3
in the garden
NP
S3
John
V
collapse

S_1 cycle:

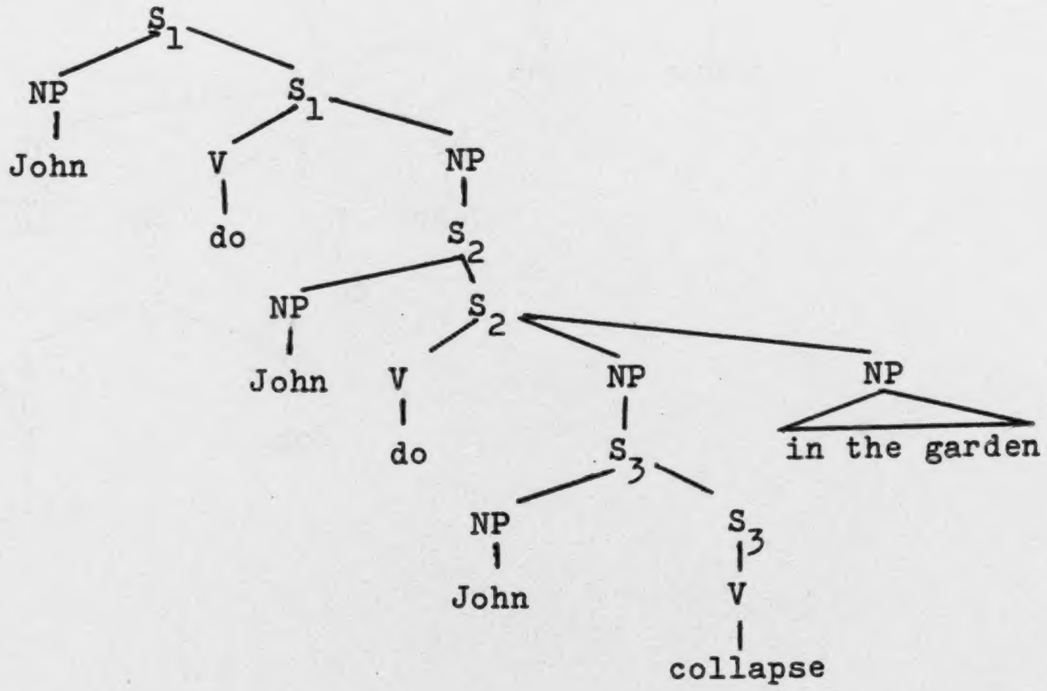
subject-raising:


S1
V
NP
NP
occur
John
S2
NP
S2
NP
John
V
NP
in the garden
do
S3
NP
S3
John
V
collapse

subject-formation


S_1
NP
John
S_1
V
occur
NP
S_2
NP
John
S_2
V
do
NP
S_3
NP
John
S_3
V
collapse
NP
in the garden

rule (40)


S_1
NP
John
S_1
V
do
NP
S_2
NP
John
S_2
V
do
NP
S_3
NP
John
S_3
V
collapse
NP
in the garden

Either *do* in this last derived structure may show up, provided its object is pronominalized.[9]

(55) John collapsed in the garden, and I'm sorry he did it.
John collapsed in the garden, and I'm sorry he did it there.

(56) John collapsed in the garden, and Harry did so too.
John collapsed in the garden, and Harry did so in the street.

(57) What John did was (to) collapse in the garden.
What John did in the garden was (to) collapse.

It is also predicted that each of the sentences in (55-57) has an agentive and a non-agentive interpretation. The derivation (54) is of the non-agentive sense, but if *occur* took an agent, *John*, subject-raising could not take place. Nevertheless, we would get the same derived structure as in (54). So the DS of the agentive sense of *John collapsed in the garden* is (58).

---

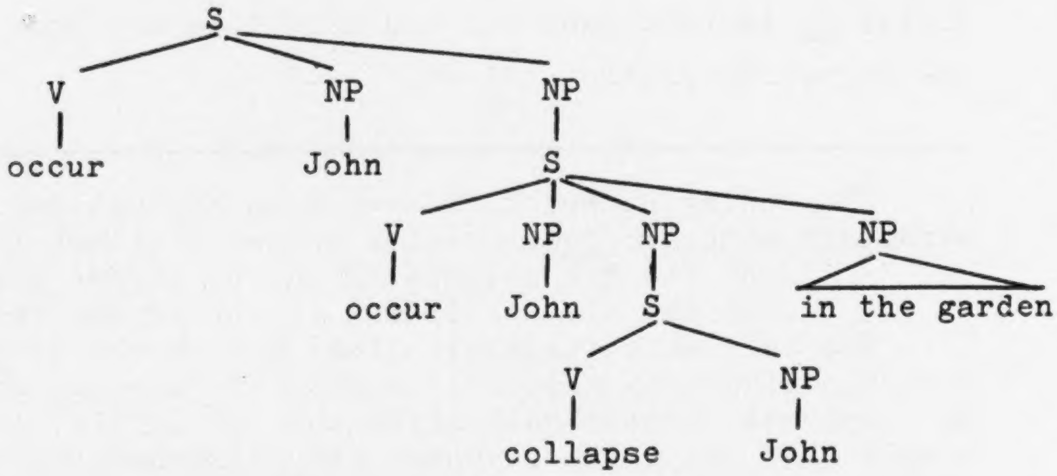
[9] Depending on which NP over S is nominalized, the derived structure with two *do*'s results in two distinct intonations:

John did *his* collapsing in the gárden yésterday.
John did his collápsing in the gárden yesterday.

The rule which pronominalizes the object of *do* (complement-pronominalization) must follow subject-raising, which is cyclic. So complement-pronominalization must be cyclic, last-cyclic, or a rule that can apply anywhere (an everywhere rule). The sentence *John decided to be arrested, and Harry did so too* shows that complement-pronominalization follows the passive transformation, which is cyclic. At least it shows this if you believe that identity erasure must precede complement-pronominalization. The sentence *John wanted to be arrested, and Harry wanted it too* seems to me to be ambiguous. If the *it* is the result of a precyclic pronominalization, Harry wanted someone to arrest John; if the *it* is the result of a cyclic or last-cyclic pronominalization, Harry wanted someone to arrest Harry.

In Lakoff (1966b) it is argued that complement-pronominalization (or S-deletion) is an everywhere rule.

(58)



Actually, we have predicted two other senses besides these two. The higher *occur* could have an agent and the lower *occur* not have an agent, or the lower *occur* could have an agent, and the higher *occur* not have an agent. It seems that the former sense is impossible, the latter O.K. John could have chosen to collapse but not chosen the garden as the place to do it. On the other hand, it is not conceivable that he should have chosen to do his collapsing in the garden, yet not have chosen to collapse. Thus we need the restriction that, if *occur* takes an agent, **any** *occur* it commands[10] must also have an agent.

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[10] Langacker (1966).

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5. We have seen why, to explain certain ambiguities and paraphrases, in some situations non-stative verbs must be commanded by *occur* in DS. It is only a small step to saying that all non-stative verbs are commanded by *occur*, and that in fact this is how non-stativity is marked. Then we can restrict the taking of an agent to *occur* alone. In fact we can define the notion of agent in the following way: a NP is an agent if in DS it is the first of at least two complements of *occur*, the second being the direct object. (Of course it remains to define "direct object.") I hope that ways along this line can be found to avoid labeling NP's, as is done in Fillmore's case grammar.

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The Syntax of the Verb "Happen"*

Dale E. Elliott

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The Syntax of the Verb "Happen"

In a paper appearing in this volume,[1] Lee has provided evidence for the appearance of the verb "occur" in the underlying structures of non-stative sentences.[2] In this way, he accounts for paraphrase relationships such as:

(1) John collapsed in the garden.

(2) John's collapsing occurred in the garden.

Sentence (3) is also a paraphrase of (1) and (2),

(3) John's collapsing happened in the garden.

and thus "happen" must also be considered here. This study analyzes in somewhat more detail structures containing the verb "happen". It will assume, as does Lee's paper, the correctness of evidence provided by Fillmore and others for putting the verb first in underlying structures, and will also make use of certain concepts provided by Fillmore in his "The Case for Case."

Consider the following structure:

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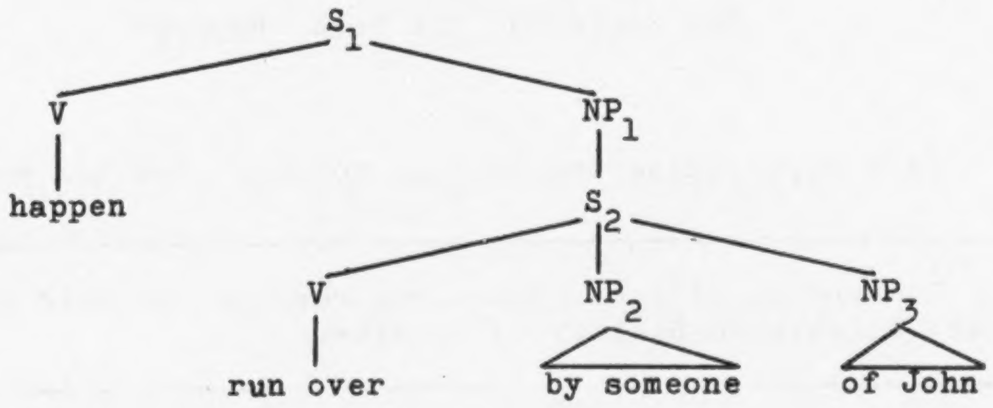
[1] A version of Lee's paper was read to the 1968 Summer meeting of the Linguistic Society of America.

[2] For a discussion of stative and non-stative verbs and adjectives, see Lakoff (1965).

A.



This structure, with details of tense, etc., added, provides for:

(4) Someone ran over John.

and

(5) John was run over by someone.

In both these sentences, "happen" is deleted. (4) is derived by subject-formation applied to NP_2 with both prepositions deleted. Deriving (5) from the underlying representation above, of course, assumes the existence of a passive transformation. The preposition "of" appears in a nominalization such as

(6) The running over of John was a tragedy.

If subject-formation is applied to NP_1, with S_2 then being nominalized, and "happen" retained as the verb, we get what is probably an ungrammatical sentence:

(7) *Someone's running over John happened.[3]

However, if there is an adverb or locative phrase present, there is at least a reduction in unacceptability:

(8) Someone's running over John happened yesterday.

(9) ?Someone's running over John happened at the corner of Broad and High.

Or, with passivization of S_2:

(10) John's being run over happened yesterday.

(11) ?John's being run over happened at the corner of Broad and High.

---

[3] However, see below, page 30.

It may be problematic whether replacing "happened" with "occurred" in (7) will give a grammatical sentence:

(12) ?Someone's running over John occurred.

There would probably be disagreement among native speakers about this point. For somewhat firmer evidence as to the relationship between "happen" and "occur", consider sentences such as the following:

(13) What happened was that John was run over.
(14) What occurred was that John was run over.
(15) What happened to John was that he was run over.
(16) *What occurred to John was that he was run over.[4]

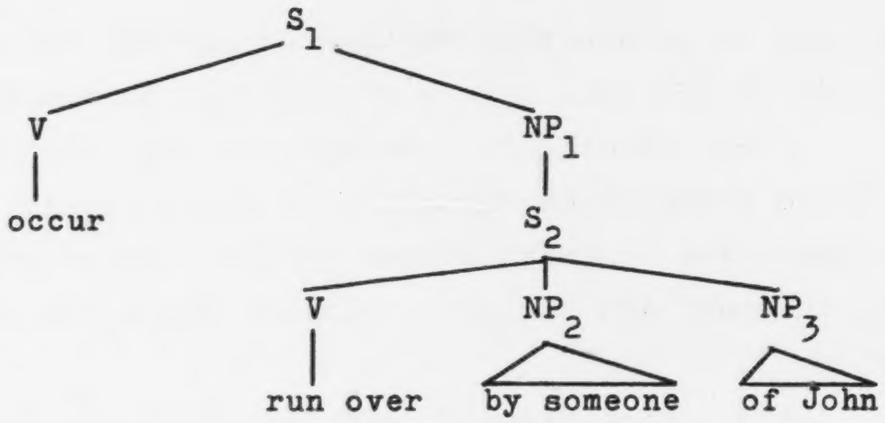
No attempt will be made here to formulate a rule for the derivation of these pseudo-cleft sentences, but presumably (13) could be derived by such a rule from the deep structure given above. This presupposes, of course, that (13) is in fact a paraphrase of (4) and (5), and that the pseudo-cleft construction in (13) expresses only an emphasis of some sort, the semantic content of which is not sufficient to warrant a different underlying representation. I believe that this is the case.

(14), then, could be derived in the same way from the following deep structure:

---

[4] "Occur" takes a dative in another meaning of course. E.g., "It occurred to me that I should go to Chicago." means "The idea came to me that I should go to Chicago." There seems to be an element of chance or unexpectedness involved here also. Another paraphrase could be "The idea happened to come to me that I should go to Chicago."

B.



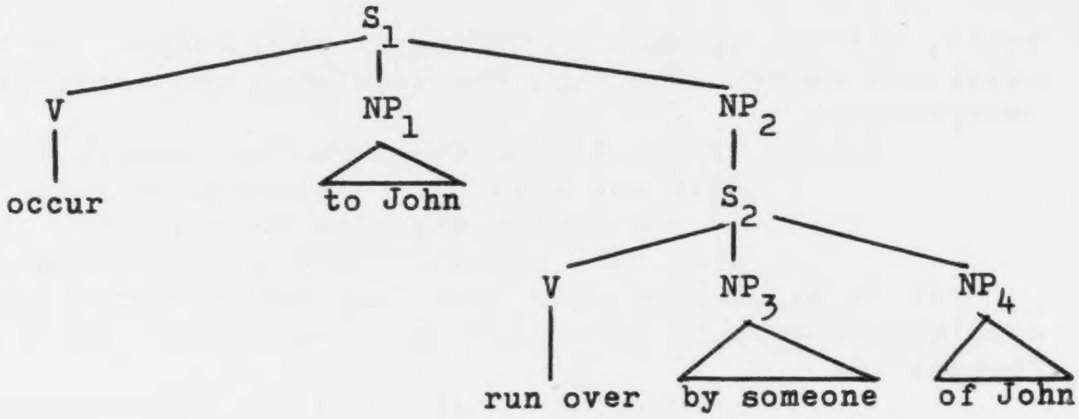
This structure, obviously, is identical to the first one above except that here the verb of S_1 is "occur" instead of "happen." Since (13) and (14) are paraphrases of each other, we can propose that this second structure is common to both, with "occur" here representing an abstract verb with two surface forms, "happen" and "occur."

Now consider sentences (15) and (16). My own interpretation of (15) is that "happen" is used here as a neutral expression to refer to some event, but that this event involved "John" in a particular way. We can use Fillmore's "Dative" case to express John's role in (15).[5] (16), on the other hand, is distinctly ungrammatical. We may say, therefore, that (15) is derived from the following structure, and that "occur" appears as "happen" obligatorily in this case because of the presence of the dative in NP_1.

---

[5] Note that if the Dative is not present, it is not felt that someone was necessarily involved as Dative, but that the Dative NP was deleted. For example, in the sentence, "What happened was that someone fired a gun," we do not automatically infer that someone else was shot.

C.



In (15), S_2 has been passivized. If this is not done, we get (17):

(17) What happened to John was that someone ran over him.

Thus it is clear that in this structure, NP_4 cannot carry the dative relationship to "occur," nor can NP_4 be a combination of dative and object.

To summarize, it has been proposed so far that "happen" is in certain cases an alternative surface form of an abstract verb "occur," that this verb takes an optional dative, and that if the dative is present, this verb is obligatorily represented as "happen."

Now consider some additional sentences with "happen," and their relationship to some of the structures discussed above.

(18) It happened that someone ran over John.
(19) It happened that John was run over.
(20) Someone happened to run over John.
(21) John happened to be run over.

There are a number of observations that can be made about these sentences. First, they are all paraphrases of each other. Second, I have a reasonably strong intuition that the verb "happen" in (18)-(21) is not used merely to express some event.[6] Rather, it

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[6] There may be a point of relevance here to the rather poorly understood grammar of English modals. For me, the following two sentences are not paraphrases of each other.

(i) It happened that I had a blowout on my car.
(ii) It was the case that I had a blowout on my car.

The reason for this is that (ii) is a neutral statement of an expresses the additional fact that the event was in some way unexpected, that there was an element of chance, or, if you will, "happenstance" involved. The same thing can be found in (22).

(22) I happened upon a nice little Italian restaurant.

(22), I would say, is paraphrased by (23) and (24).

(23) I happened to find a nice little Italian restaurant.
(24) It happened that I found a nice little Italian restaurant.

---

event, but (i) is not, differing in this respect in the ways mentioned above. However, the following two sentences *are* paraphrases:

(iii) If you strike the curb too sharply, it may happen that you will have a blowout on your car.
(iv) If you strike the curb too sharply, it may be the case that you will have a blowout on your car.

It is maintained here that "happen" does not take "that" complements when it is semantically equivalent to "occur." I.e., "happen" in

(v) It happened that I found a five-dollar bill.

has only the non-"occur" interpretation. However, when a modal is present, this does not seem to be the case.

We might want to propose a common underlying structure for (iii) and (iv), one which would yield:

(vi) If you strike the curb too sharply, it may be the case that your having a blowout on your car will happen.

and also (iii) and (iv) above. But if we have, without the modal:

(vii) If you strike the curb too sharply, it *is* the case that your having a blowout on your car will happen.

we can obtain only:

(viii) If you strike the curb too sharply, it is the case that you will have a blowout on your car.

but not (in the desired sense):

(ix) *If you strike the curb too sharply, it happens that you will have a blowout on your car.

The neutral interpretation of "happen" in (iii) appears to be the result of the presence of the modal "may."

Further examples include:

(x) Judging from the evidence, it must have happened that the victim was shot from very close range.
(xi) It could have happened that Fred took an earlier plane, since he has already checked out of the hotel.

Of course, claiming that (22)-(24) are paraphrases of each other involves one in peculiar problems concerning "find" and "upon," but the point I wish to make is that the force of "happen" in (18)-(21) is in some sense equivalent to its force in (22).

Thirdly, the following sentences are all ungrammatical:

(25) *It occurred that someone ran over John.
(26) *It occurred that John was run over.
(27) *Someone occurred to run over John.
(28) *John occurred to be run over.

Fourthly, the following are at least peripherally grammatical:

(29) Someone's happening to run over John $\left\{\begin{array}{l}\text{occurred}\\ \text{happened}\end{array}\right\}$ yesterday.

(30) John's happening to be run over $\left\{\begin{array}{l}\text{occurred}\\ \text{happened}\end{array}\right\}$ yesterday.

Note that the structures underlying (29) and (30) must be made available in order to account for dialogues like the following:

"Someone happened to run over John."

"When did it $\left\{\begin{array}{l}\text{occur}\\ \text{happen}\end{array}\right\}$?"

"It $\left\{\begin{array}{l}\text{occurred}\\ \text{happened}\end{array}\right\}$ yesterday."

"John happened to be run over."

"When did it $\left\{\begin{array}{l}\text{occur}\\ \text{happen}\end{array}\right\}$?"

"It $\left\{\begin{array}{l}\text{occurred}\\ \text{happened}\end{array}\right\}$ yesterday."

Furthermore, the question "Where did it $\left\{\begin{array}{l}\text{occur}\\ \text{happen}\end{array}\right\}$?" can also be asked, forcing us to allow for the occurrence of locative phrases in structures like those underlying (29) and (30). Also, to:

"Someone happened to run over John."

one may reply:

"I don't believe that it happened."

The structure underlying the embedded sentence here must be one which would yield (7).

Finally, we have the following pseudo-cleft sentences:

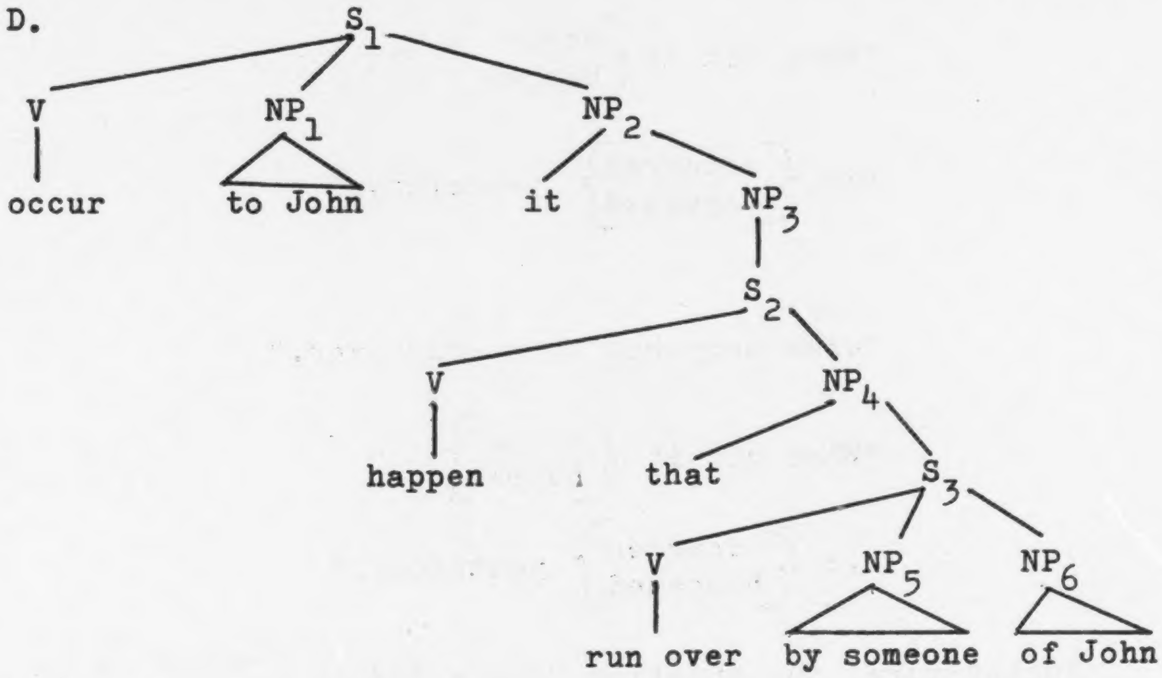
(31) What $\left\{\begin{array}{l}\text{occurred}\\\text{happened}\end{array}\right\}$ was that John happened to be run over.

(32) What $\left\{\begin{array}{l}\text{occurred}\\\text{happened}\end{array}\right\}$ was that someone happened to run over John.

(31) and (32) are probably also acceptable with the dative NP "to John," given the appropriate pronoun adjustments, and replacement of "occurred" with "happened."

We can, then, propose the following deep structure:

D.


S_1
V
occur
NP_1
to John
NP_2
it
NP_3
S_2
V
happen
NP_4
that
S_3
V
run over
NP_5
by someone
NP_6
of John

If the dative NP_1 is not present, and the V "occur" of S_1 is deleted, we obtain, with further necessary operations, sentences (18)-(21). If S_2 is nominalized and there is an adverb present, we get (29) or (30), depending on whether or not S_3 is passivized. If the pseudo-cleft transformation is applied, we get (31) or (32), or their respective counterparts with the dative "to John" if it is present in the deep structure.

Note that in this structure the main verb of S_2 is "happen" and not "occur." The most important reason for this, I think, is the semantic difference between the verb "happen" and the verb "occur," which, as noted, appears in certain environments as "happen." This permits us to say that "occur" appears in deep structure only as the main verb of the highest S in non-stative sentences, whereas "happen" is an instance of noun-phrase complementation, as suggested by Rosenbaum.[7]

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[7] This is somewhat oversimplified. Cf. Peter Rosenbaum, (1967), p. 74.

It should be pointed out that it is somewhat too general to say that "occur" appears only in non-stative sentences, since although (33) is ungrammatical, (34) is acceptable.

(33) *What happened was that John was tall.

(34) What happened was that John remembered his lesson.

Notice, however, that (35) is also probably acceptable.

(35) What happened was that John was too tall for the police force.

Although "occur" may appear in a stative sentence like (34), it does not permit a dative in this case, nor is a dative permissible with an adjective like "tall."

(36) *What happened to John was that he remembered his lesson.

(37) *What happened to John was that he was tall.

I am not sure about (38).

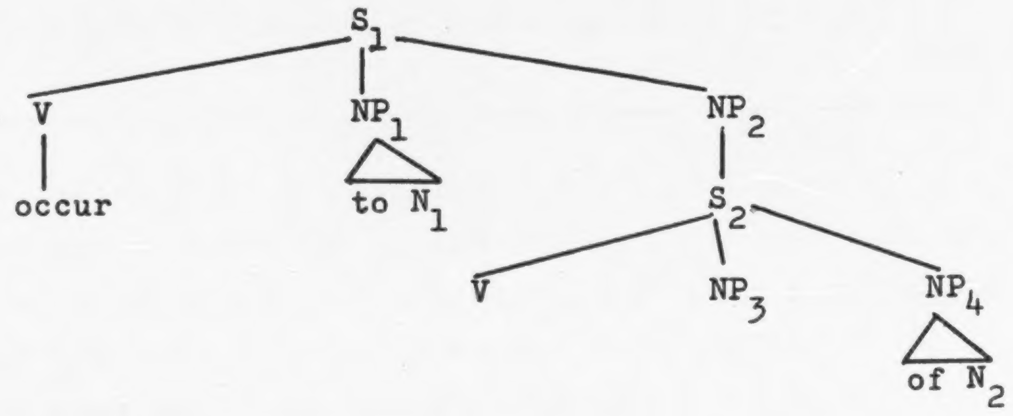
(38) ?What happened to John was that he was too tall for the police force.[8]

Depending on the classes of sentences one accepts and rejects, the possibilities for S in the pattern

What happened to N was that S

may present some peculiar semantic problems.

E.



From a deep structure like E, we may derive a pattern like the above provided that N_1 in the dative $NP_1 = N_2$, and N_2 is object or equivalent to the N in the agent NP_3. That is, we may have:

(39) What happened to John was that someone ran over him. (= 17)

(40) What happened to John was that he killed himself.

but (41) and (42) appear to be deviant:

(41) What happened to John was that someone ran over Mary.

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[8] J. R. Ross, in a comment on Lee's paper at the 1968 Summer LSA meeting, brought up a sentence which, as I remember it, was approximately the following:

(i) All this meteorite has to do to disprove your theory is to contain nitrogen.

This is essentially paraphrased by:

(ii) All that has to happen to disprove your theory is for this meteorite to contain nitrigen.

Contain, of course, is a stative verb.

(42) What happened to John was that Harry killed himself.

This would predict that (43) and (44) are also deviant:

(43) What happened to John was that he gave Mary a flower.

(44) What happened to John was that he sold his car.

But the following seem acceptable:

(45) What happened to John was that he jumped off a cliff.

(46) What happened to John was that there was a snowstorm and he can't get out of his house.

If it is true that, if the conditions given above on a deep structure like E are satisfied, we may then derive sentences following the pattern of (39) and (40), then these conditions should be retained, since, as was noted, they account for the deviance of (41)-(44). It may remain then, to account for (45) and (46) and many similar sentences by considering that the complement S's in (45) and (46) are, let us say, "malefactives." Presumably, some suitable formalism could be devised for this purpose.

Of course, it is possible to invent situations in which sentences like (43) and (44) are acceptable. For example, John may have a black eye and Irving asks Hortense "What happened to John"? and Hortense replies "(43)." This would be acceptable as an answer if both Irving and Hortense knew independently of this particular situation that Mary customarily gives black eyes to people who give her flowers. Still, it is the case that falling off cliffs and being snowbound are, as a rule, immediately recognized as being undesirable, but giving people flowers and selling one's car are not. Nevertheless, I would be wary of trying to make a serious issue out of this point.

I still maintain that (43) and (44) are somehow odd, but a further complication is introduced by such completely acceptable sentences as (47):

(47) Being chosen Miss America was the greatest thing

that ever happened to Ernestine Heffelfinger of Chillicothe, Ohio.

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Subjects and Agents*

P. Gregory Lee

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Subjects and Agents

0. Introduction.

In this paper a theory will be developed about the representation of purpose in deep structure. The theory is that a sentence expresses purpose if and only if its deep structure has a subject. Consider, for example, the following sentence:

John frightened the baby.

There are two interpretations of this. Either John may have frightened the baby on purpose, or it may have been something about John or something he did that frightened the baby. The ambiguity will be accounted for by assigning this sentence two deep structures. The deep structure corresponding to the purposive interpretation has the subject _John_. The non-purposive interpretation, on the other hand, corresponds to a subjectless deep structure.

The argument will proceed in three steps. In sections 1-4 we will narrow down the general problem of how purpose is represented in deep structures to a more tractable subproblem. The subproblem is to account for the identity between subjects of clauses introduced with _by_ and subjects of the main sentences in which these _by_-clauses occur.

In sections 5-9 it will be shown that this identity must be accounted for in two different ways. The first solution presupposes the presence of a deep structure subject, while the second presupposes a subjectless deep structure. Certain verbs, in fact, take optional subjects. Next, in section 10, we show that sentences with these verbs have a purposive interpretation if and only if there is a deep structure subject.

1. Extra complements and purposiveness.

There are a number of instances where the presence of an optional noun phrase complement to a verb is connected with purposiveness. Such an instance is the pair of sentences,

John broke the window.
The window broke.

We note that the first sentence may express purpose while the second may not. Furthermore, all the elements of the second sentence (*the window* and *broke*) have corresponding elements in the first sentence. The reverse is not the case, of course, since there is no *John* in the second sentence. We may reasonably conclude that the appearance of the complement *John* has something to do with the purposive interpretation of the first sentence. A similar example is

John broke the window with the hammer.
The hammer broke the window.

The elements all match up except for *John* and *with* in the first sentence.

The appropriate place to compare the complement structures is at the level of deep structure rather than surface structure. Consider

Harry broke John's leg with the tractor's right front wheel.

versus

The tractor broke John's leg with its right front wheel.

On the surface, *break* has the same number of complements in each sentence, while the first sentence has a purposive interpretation and the second does not. In the second sentence, however, *the tractor* does not represent a deep structure complement. Note that *its* is a pronominalization of *the tractor's*, and cannot be construed in any other way. The subject *the tractor* thus does not contribute to the meaning of the sentence, since we have the paraphrase

The tractor's right front wheel broke John's leg.

That we must look at deep structures to find the extra complement is of course not surprising, since purpose is an aspect of the meaning of the sentence. By hypothesis, deep structures reflect the meaning of sentences more closely than surface structures.

We will follow Fillmore[1] in terming these extra complements that have something to do with purpose 'agents'. About agents the following can be said. 1) They always refer to things or beings that can have purposes; hence, things that can at least move about on their own and, most often, thinking beings. 2) The sentences in which they occur express purpose, and the agent tells whose purpose. 3) If an agent is present, it becomes the surface subject unless the subject is deleted or the sentence is passivized. This last fact provides some justification for identifying agent with deep structure subject, at least in one direction. That is, if we say that an agent is always a deep structure subject, then (if nothing happens on the way to the surface) the agent will automatically become the surface subject.

Aside from *break*, two other verbs that take optional agents are *begin* and *have*. David Perlmutter has shown this to be the case with *begin*, in his dissertation, *Deep and Surface Constraints in Syntax* (M.I.T., unpublished, 1968). *Begin* takes one noun phrase complement in the deep structure of

The water began to freeze.

In the deep structure of

John began to freeze the water.

there is an extra complement, the agent *John*.

The situation with *have* is illustrated by

John has a shade on the lamp.
The lamp has a shade on it.

In the first sentence *John* is the agent, one of three complements. The deep structure of the second sentence has only two complements, *a shade* and *on the lamp*. The superficial subject

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[1] C. J. Fillmore, "The Case for Case" in *Universals in Linguistic Theory*, eds. E. Bach and R. Harms, Holt, Rinehart and Winston; 1968, pp. 1-88. Fillmore gives an extensive account of examples like those I have cited. I have just paraphrased some of what he says.

the lamp is secondary. (See my earlier paper "The English Preposition *With*" in *Working Papers in Linguistics* No. 1, 1967.)

In these examples the surface structure difference between the purposive and non-purposive sentences is not just the presence or absence of an agent. There are concomitant differences either in order, or in the appearance of a secondary noun phrase as subject of the non-purposive sentence. It is these other differences that cause trouble for any theory which seeks to localize the purposive element in the agent, since the other differences must be explained as automatic. That is, one must motivate transformations which introduce these differences. Justifying such transformations is not an easy task. There are cases, however, where the absence of an agent does not entail such differences. Notice that a genitive preceding and modifying the noun *reason* must be the genitive of an agent. Compare:

John's reason for falling down
the reason for John's falling down

The "reason" in the first phrase is a motive, and has to do with purpose. In the second phrase, besides being interpretable as a motive, the "reason" can be merely a cause. Unlike the first phrase, the second phrase need not express purpose. Knowing as little as I do about the syntax of *reason*, however, I acknowledge that this may be a rather superficial example.

Something similar is going on with the noun *way*. Compare:

What is John's way of doing that?
What is the way in which John does that?

"Way" in the first sentence is method, in the second sentence "way" is not necessarily method. The syntax of *way* is intimately involved with the behavior of manner adverbs, which will be discussed in the next section.

2. Agents and manner adverbs.

The principal concern of this paper will be the relationship of agents to a peculiar type of manner adverbs, i.e. by-clauses. This section will examine, in a cursory fashion, the relationship of agents to manner adverbs in general.

A first question to ask about manner adverbs is: Where do they occur? We will discuss the matter from the standpoint of George Lakoff's paper "Stative Adjectives and Verbs in English" (in NSF-17, Harvard Computation Laboratory; 1966). In Lakoff's paper we find two statements about the provenience of manner adverbs:

> "Manner adverbials that are subcategorized with respect to subjects can occur only with NON-STATIVE verbs. STATIVE verbs may not take such adverbials." (p. I-10)
>
> "Since stative verbs cannot take manner adverbials, they do not co-occur with the manner noun "way"." (footnote, p. I-10)

"Manner adverbials that are subcategorized with respect to subjects" refers to adverbs that only occur with animate main sentence subjects. Lakoff's examples are enthusiastically, carefully, reluctantly, masterfully.

Notice that the two claims about manner adverbs, if taken quite literally, are distinct. In the first place, it is claimed that manner adverbs like enthusiastically only occur with non-stative verbs. In the second place the claim is extended to all manner adverbs. We will try to find out in what sense the broader generalization about manner adverbs holds.

Let us look first at the non-stative/stative distinction. It is a classification of verbs according to whether they can appear in a certain set of contexts. There are a number of environments, e.g. the command imperative, in which only non-stative verbs may occur. The point I wish to make here is that the tests should be divided into two groups. Some tests test for something that is quite different from what the others test for. There are two grounds for the division I propose--distributional and semantic.

The first group of tests--let us call them 'A-tests'--is whether or not verbs can occur:

1) in the command imperative (Slice the salami.)
2) in the infinitival complements of persuade, remind (I persuaded John to slice the salami.)
3) with manner adverbs that require animate subjects (John sliced the salami enthusiastically.)

Other verbs that satisfy these tests are, e.g., kill, cause, annoy, assassinate. Thus these verbs are non-stative. Verbs that do not pass these tests and are therefore stative are, e.g., know, entail, love.

The second group of tests we will call 'P-tests.' For the moment we mention only one; another will be added later. The P-test is whether or not a verb can occur in the progressive. The non-stative verbs above, which pass the A-tests, may all occur in the progressive, while none of the stative verbs may. The remaining tests Lakoff gives I will not discuss.

The first thing to note is that there are verbs which pass the P-test, but fail the A-tests. Such verbs are rain, snow, happen, occur. So far as I know, however, there are no verbs which pass the A-tests but fail the P-test. We are led therefore to suspect that two different properties of verbs are involved--A and P. Semantically these two properties appear to be the following: verbs which pass the A-tests are verbs which can appear as main verbs in sentences which express purpose. Indeed, the contexts which provide the A-tests are contexts which require a purposive interpretation. The progressive, on the other hand, expresses a process (with exceptions as noted by Lakoff--sit, keep, etc.). It follows that only verbs which can express processes pass the P-test.

The stative verbs, which fail all the tests, do so for two different reasons. *Know*, for example, fails the A-tests because "knowing" cannot be purposeful. It fails the P-test because "knowing" is not a process.

Thus the verbs which pass the P-tests, but fail the A-tests are verbs which express processes which cannot be purposeful. I have no explanation for the fact, if it is a fact, that verbs which cannot express process can also not express purpose.

Aside from the anomaly of *rain*-type verbs, this subcategorization of the tests for non-stativity accounts for the following fact. There are a great number of verbs which can express purpose or not. For example, *cause*, *annoy*, *persuade*, *frighten*. Thus there are sentences in which these verbs appear which are ambiguous in having either an agentive or a non-agentive interpretation. For example,

John frightened the baby.

When ambiguous sentences of this sort are subjected to the A-tests, however, the ambiguity disappears.

Harry persuaded John to frighten the baby.

When they are subjected to the P-test, the ambiguity remains.[2]

John was frightening the baby.

We say, then, that *frighten* and other such verbs possess the property P, but either possess the property A or not. This gives rise to the ambiguity. In a context which demands the A property, the -A variety of *frighten* is disallowed, thus only one reading is possible.

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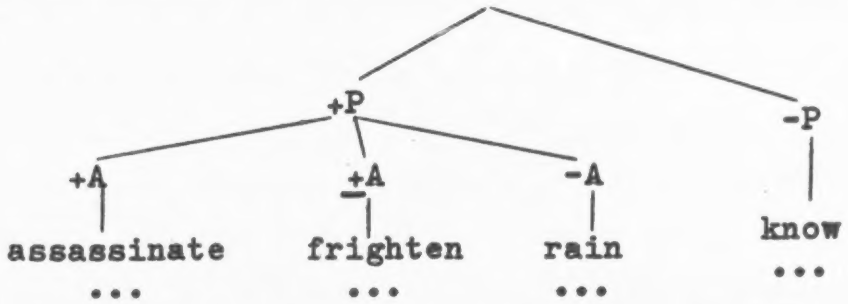
[2] There seems to be an intonational difference in the two senses. The non-purposive sense requires stronger stress on the verb (but not contrastive stress). Compare

The sky was frightening the baby.

??The sky was frightening the baby.

Notice that it would not do to say that there are two verbs *frighten*, one of which is non-stative, the other stative, because both varieties of *frighten* satisfy the P-tests and are therefore non-stative.

There are, of course, verbs which do not display this ambiguity and pass both groups of tests. Such verbs are *assassinate*, *eat*, *try*. We have the following classification of verbs, according to whether they possess the properties A and P:



Let us now discuss appropriate designations for the properties A and P. With some misgivings I retain the term 'non-stative' for P. The term is perhaps not entirely felicitous, since the semantic property associated with P is process, and there are verbs, e.g. *hear*, which do not express states, yet usually do not express processes either. Another misgiving is occasioned by uncertainty as to whether P is most properly referred to as inhering in the verb. Fortunately, resolving these matters does not appear to be crucial for the present investigation.

The property A has to do with purposiveness and has something to do with both the verb (or the whole predicate) and its subject. For example, to say that *John ate* expresses purpose implies that *John* refers to a thinking being and that *eat* refers to a purposeful action. Sentences with the property A are limited as to their subjects as well as to their verbs. If we wish to "localize" A, then, we have two choices. A can be made a property of subjects or verbs. With the former choice an appropriate name for A is 'agent'; with the latter choice we would use 'purposive'. Shall we then speak of subjects as 'agents', or of verbs as 'purposive'? I choose the term 'agent' for the four reasons below.

First, ascribing a feature ±purposive to verbs would mean that we must represent, e.g. frighten as two distinct verbs: [FRIGHTEN, +purposive] and [FRIGHTEN, -purposive]. There will be a very large number of such pairs of verbs in which phonological form is the same for each member of the pair, and the meaning is very nearly the same, differing systematically. This mode of representation seems very awkward, since the close relationship between the members of each pair cannot be displayed in any direct fashion.

Second, ascribing the agent property to noun phrases is the stronger theory. If we use agents, we must mark those non-stative verbs which must have an agent as subject as well as those which may not take an agent. We need say nothing in this regard about frighten, which will be represented as a single verb which is indifferent as to the nature of its subject. Then we predict the absence of any pairs of verbs such that one member of the pair requires an agent and the other disallows an agent, the meanings of the verbs being otherwise identical. This situation could of course be handled, but it is not expected. So far as I know, there are no such pairs of verbs. (Convince/believe is not such a pair, since convince need not take an agent.)

Third, there is evidence to suggest that there is only one verb frighten. This is the fact that frighten in a sentence with an agent can delete frighten in a sentence without an agent and the other way around.

> John was able to frighten the baby more thoroughly
> than the statue ever did.
>
> The statue frightened the baby more thoroughly
> than John was ever able to.

The fourth consideration is heuristic in nature. The notion agent appears more analyzable than the feature agentive.

At least a partial analysis of agent will be given in section 10.

We return now to manner adverbs. The manner adverbs which require animate subjects provide one of the A-tests. We will say then that these manner adverbs occur only with agents. It seems true that manner adverbs in general, including those that allow inanimate subjects, only occur in sentences which express process. Hence the restriction on manner adverbs is that they occur with non-stative verbs. Ability to occur with manner adverbs like quickly can be regarded as another P-test. We have for example,

John sliced the salami quickly.

but

*John knew Sanskrit quickly.
*That entailed a strange fact quickly.
*John heard the jet quickly.

To summarize, the categorization stative/non-stative is given by a number of tests. If a verb can co-occur with any manner adverb, the verb is non-stative. Still, the distribution of the subclass of manner adverbs that require animate subjects is different from the distribution of manner adverbs in general, and the difference is not adequately expressed by the animate subject requirement. We must instead refer to agents. This difference extends to the other tests for non-stativity.

There are undoubtedly many problems connected with the broader generalization that manner adverbs only occur with non-stative verbs. It appears to me that the distinction between the two groups of tests for non-stativity would be necessary in any event.

There is one problem which at least deserves mention. We would expect, parallel with the verbs, a third class of manner adverbs--those which would not allow agents. It might be thought that adverbs which expressly disavow purpose, like inadvertantly, accidentally, are such. However these adverbs can occur with verbs which require agents.

John ate an olive inadvertantly.

?John inadvertantly ate.

Perhaps you will agree with me that there is something a bit odd about such sentences. More normal seems to be

John inadvertantly ate an olive.

What seems to be going on is that there are differences in the scope of a manner adverb correlated in some obscure fashion with where it comes in the sentence. In the above sentence the inadvertance was committed with respect to the olive, not the eating. In other cases such manner adverbs imply a purpose that has nothing to do directly with either the subject or the verb. For example,

That happened accidentally.

The train accidentally went off the tracks.

I received the package accidentally.

Perhaps these adverbs are restricted to sentences which express events. For an illuminating and extremely discouraging discussion of such problems, see J. Austin's article "A Plea for Excuses" (in Philosophical Papers, Oxford; 1961, pp. 123-152).

3. By-clauses.

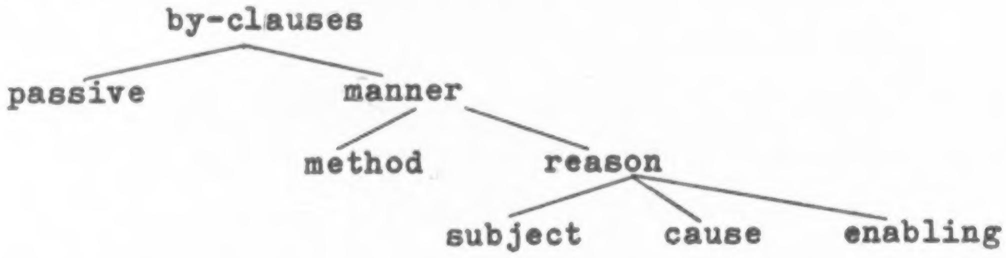
In order to avoid problems connected with manner adverbs in general, we will discuss only manner adverbs of a particular form; that is, by-clauses. By-clauses consist of by and a factive nominal in -ing. For example, by shooting him in

John assassinated the Premier by shooting him.

is a by-clause.

In fact, we will not even be able to discuss by-clauses in general, but will discuss only two kinds of by-clauses, which we term 'subject' and 'method' by-clauses. The task of this section is to delineate these two types of by-clauses; that is, to show that they are syntactically and semantically distinct from each other, and from other types of *by*-clauses.

The following chart summarizes the different types of *by*-clauses:



In explicating this chart, we will start at the bottom with 'enabling' *by*-clauses. Examples of 'enabling' *by*-clauses are the following:

> John overheard the conversation by having his ear to the door.
>
> John avoided the draft by being eight feet tall.
>
> John beat Harry at swimming by wearing fins.

Characteristically, sentences with 'enabling' *by*-clauses have paraphrases with the verb *enable*.

> Having his ear to the door enabled John to overhear the conversation.
>
> John's being eight feet tall enabled him to avoid the draft.
>
> Wearing fins enabled John to beat Harry at swimming.

Succeed in + ing can be interpolated into a main sentence which contains an 'enabling' *by*-clause without any considerable change in meaning.

> John succeeded in overhearing the conversation by having his ear to the door.
>
> John succeeded in avoiding the draft by being eight feet tall.
>
> John succeeded in beating Harry at swimming by wearing fins.

If we consider the last three sentences to be more basic than the sentences without *succeed in*, then we will have achieved three things. 1) The fact that the presence or absence of succeed in makes no difference in the meaning will be accounted for. 2) Since whatever one succeeds in doing is viewed as a success, we will have explained why 'enabling' by-clauses only occur in sentences which express success. 3) As will be seen shortly, 'enabling' by-clauses can be subsumed under the category of 'cause' by-clauses. We will then be able to account for the paraphrases with enable.

The following sentences provide examples of 'cause' by-clauses:

John broke his leg by falling down.
John received the bite by neglecting to muzzle
his dog.
John suffered greatly by being an only child.

These by-clauses give the cause for whatever is expressed in the rest of the sentence. Sentences with 'cause' by-clauses have paraphrases with the verb cause.

John's falling down caused him to break his leg.
Neglecting to muzzle his dog caused John to
receive the bite.
Being an only child caused John to suffer greatly.

There is no condition on the stativity of either the verb of the main sentence or the verb of the by-clause. Each may be either stative or non-stative, as is illustrated in the above sentences. Receive the bite is stative, while break and suffer are non-stative. Be an only child is stative, while fall down and muzzle are non-stative. Notice, however, that the main sentence may not have an agent; that is, the main sentence does not express purpose. If in the sentence,

John broke his leg by falling down.

we suppose John's breaking of his leg to have been deliberate, then the by-clause is no longer a 'cause' by-clause. The by-clause doesn't mean "cause" any longer, and the sentence cannot be paraphrased by a sentence with the verb cause. As a result of this same restriction, verbs which require agents, like assassinate, donnot take 'cause' by-clauses. For example, the following sentences are not paraphrases.

John assassinated the Premier by shooting him
≠ Shooting the Premier caused John to assassinate him.

At first sight 'cause' and 'enabling' by-clauses seem to differ in this respect, since we get paraphrases like:

John assassinated the Premier by having a long-range rifle.
= Having a long-range rifle enabled John to assassinate the Premier.

But on the hypothesis that 'enabling' by-clauses result from the deletion of succeed in, 'enabling' by-clauses are also restricted to occurring with main sentence subjects which are not agents. This is so because succeed in does not take an agent subject.

In fact, the succeed in sentences postulated as the sources of sentences with 'enabling' by-clauses have 'cause' by-clauses.

John succeeded in overhearing the conversation by having his ear to the door.
= Having his ear to the door caused John to succeed in overhearing the conversation.

This also gives an intuitively correct account of the sentences with enable, since we can set enable one to equal to cause one to succeed in + ing.

Returning to a previous example,

John broke his leg by falling down.

we may note that the by-clause here can be interpreted either as a 'cause' or an 'enabling' by-clause, depending on whether John's breaking his leg is counted as a success. There is yet a third interpretation of this by-clause, as 'method', which we will get to later.

We turn now to 'subject' by-clauses. It is convenient for the moment to restrict the examples to by-clauses which do not contain agents. Consider:

John annoyed Mary by being tall.

The blanket confined the explosion by being on top of the grenade.

John delayed our departure by having locked the door.

Characteristic paraphrases are:

John's being tall annoyed Mary.

The blanket's being on top of the grenade confined the explosion.

John's having locked the door delayed our departure.

The term 'subject' has been chosen, because the subjects of these paraphrases are the same as the 'subject' *by*-clauses, except that the *by* is gone, and the deleted subject is restored.

It is not clear whether there is any semantic difference between 'cause' and 'subject' *by*-clauses. Both express causes. The difference is in the characteristic paraphrases. 'Cause' *by*-clauses do not have paraphrases like those cited immediately above, and 'subject' *by*-clauses do not have paraphrases like the paraphrases we found for 'cause' *by*-clause sentences. The following, for example, are unacceptable in the required sense.

*The blanket's being on top of the grenade caused it to confine the explosion.

*Having locked the door caused John to delay our departure.

'Subject' *by*-clauses are also different from 'cause' *by*-clauses in that 'subject' *by*-clauses do not occur with stative main sentence verbs. At least, I have found no exception to this generalization. We find 'subject' *by*-clauses with main sentence verbs of the following four classes.

I	II	III	IV
cause	prove	annoy	persuade
make	demonstrate	impress	remind
prevent	show	frighten	convince
preclude	verify	surprise	teach
necessitate	imply	discredit	order
restrict	foretell	dismay	encourage
	emphasize	please	challenge
	guarantee	alarm	force
	betray		doom

The verbs under I take a sentential object; those under II take an indirect object and a sentential object; under III, an animate object; under IV, an animate object and a sentential object. A question that seems worth investigating is what properties these verbs share, besides the ability to co-occur with 'subject' *by*-clauses. A conjecture comes immediately to mind. Perhaps all the verbs are causative and take sentential objects. To maintain this generalization, we would have to say that the verbs under III are defective in requiring their sentential objects to be deleted. As George Lakoff has pointed out to me, the verb *interest* seems to be like the class III verbs except in this regard. *Interest* allows the sentential object in full form.

$$\left\{\begin{array}{l}\text{Mary was annoyed at}\\ \text{*Harry annoyed Mary at}\\ \text{Mary was interested in}\\ \text{Harry interested Mary in}\end{array}\right\}\ \text{being elected.}$$

'Subject' and 'cause' and 'enabling' *by*-clauses are all included under the category of 'reason' *by*-clauses. The term 'reason' was chosen because all these *by*-clauses express reasons. To illustrate:

John annoyed Mary be being tall. = The reason that John annoyed Mary was that he was tall. ('subject')

John broke his leg by falling down. = The reason that John broke his leg was that he fell down. ('cause')

John overheard the conversation by having his ear to the door. = The reason that John overheard the conversation was that he had his ear to the door. ('enabling')

Another property that all 'reason' by-clauses share is that the subject of the main sentence is not an agent. This has already been shown for 'causing' by-clauses. Note that sentences with 'subject' by-clauses fail the tests for agents:

imperative: *Annoy Mary by being tall!

persuade/remind: *Harry persuaded/reminded John to annoy Mary by being tall.

carefully, etc.: *John carefully annoyed Mary by being tall.

Thus we do not find 'subject' by-clauses with main sentence verbs which require their subjects to be agents. The case where 'subject' by-clauses contain agents will be discussed below. It will be found that they do not violate this constraint.

The next category to be considered is that of 'method' by-clauses. Justification of the term lies in the fact that these by-clauses express method.

John assassinated the Premier by shooting him.

John borrowed five dollars by putting his wife as collateral.

John surrendered by throwing a rag out the window.

Sentences with 'method' by-clauses always contain agents. As may be easily verified, they satisfy the tests for agents. Moreover, 'method' by-clauses never occur when the main sentence verb is stative, since stative verbs don't take agents. Non-stative verbs which do not allow agents are also out. The sentence,

It happened by being prayed for.

cannot be interpreted as containing a 'method' by-clause. Rather here we have a 'cause' by-clause.

The sentence given above to illustrate 'method' *by*-clauses have agent-only verbs. The point in choosing such verbs was to reduce ambiguity by eliminating the possibility of interpreting the *by*-clauses as 'reason' *by*-clauses. The ambiguity is not entirely eliminated, however, because as was noted previously 'enabling' *by*-clauses can occur with agent-only verbs. The earlier example of an 'enabling' *by*-clause,

John assassinated the Premier by standing in line.

can also be interpreted as having a 'method' *by*-clause. We could imagine that the Premier had a fatal fit upon seeing John standing in line, and John intended this to happen, for example. This type of ambiguity disappears, though, when one of the tests for agents is applied. There is only one interpretation of

Harry persuaded John to assassinate the Premier by standing in line. (Where John is the understood subject of *stand*.)

The interpretation as an 'enabling' *by*-clause disappears, thus supporting our contention that sentences with agents may not also have 'reason', including 'enabling' *by*-clauses. It may seem a contradiction to say that the subject of a sentence with an agent-only verb is not an agent, but it isn't really. What we are saying is that in case the sentence has an 'enabling' *by*-clause, the agent-only verb is not the main verb. The main sentence verb is really *succeed in*. The situation is similar to that obtaining with the perfect *have*. The subject of a sentence in the perfect is never an agent, even though the 'main verb' may be an agent-only verb. Notice:

John assassinated the Premier.

*Have assassinated the Premier!

In this same connection another important property of 'method' *by*-clauses may be mentioned. In addition to the requirement that the main sentence contain an agent, a 'method' *by*-clause must itself contain an agent. 'Enabling' *by*-clauses do not have this requirement. Therefore, a sentence whose main verb is an agent-only verb and which contains a by-clause with a stative verb has only one interpretation; the by-clause is unambiguously 'enabling'.[3] E.g.,

John assassinated the Premier by being first in line.
John borrowed five dollars by knowing the ins and
outs of high finance.
John surrendered by being able to satisfy his comrades
that it was the right thing to do.

Since these sentences contain 'enabling' by-clauses, and since 'enabling' by-clauses do not occur when the main sentence subject is an agent, we expect the sentences to fail the tests for agents. They do.

*Assassinate the Premier by being first in line!
*Harry persuaded John to assassinate the Premier by
being first in line. (Where the by-clause
subject is John.)
*John methodically assassinated the Premier by being
first in line.

Another way to tell 'method' and 'reason' by-clauses apart is the ability of 'reason' by-clauses to be preposed to the beginning of the sentences. 'Method' by-clauses cannot be preposed. One can also change around sentences with 'reason' by-clauses so that the by-clause becomes a main, finite sentence while the former main clause becomes non-finite and subordinate. The by-clause is represented at the beginning of the former main clause by thereby. First we will illustrate the preposability of 'reason' by-clauses.

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[3] Some people don't get 'enabling' interpretations at all when the main sentence verb is one that requires an agent. I don't know why. The analysis of 'enabling' by-clauses is not a central concern for the present investigation, so if the reader finds the sentences with them unacceptable, he should not on that account feel prejudiced against the main conclusions of this paper.

By being first in line John assassinated the Premier. ('enabling')

John was first in line, thereby assassinating the Premier.

By falling down, John broke his leg. ('cause')

John fell down, thereby breaking his leg.

By being tall John annoyed Mary. ('subject')

John was tall, thereby annoying Mary.

The examples given for 'method' by-clauses, recall, were ambiguous in having either a 'method' or an 'enabling' interpretation. When the by-clauses are preposed, the 'enabling' interpretation is the only possible one (and one has to strain to get even that, sometimes).

By shooting him John assassinated the Premier.

John shot the Premier, thereby assassinating him.

By putting his wife as collateral John borrowed five dollars.

John put his wife as collateral, thereby borrowing five dollars.

By throwing a rag out the window John surrendered.

John threw a rag out the window, thereby surrendering.

With a manner adverb that requires an agent, these sentences are unacceptable.[4]

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[4] The fact that some by-clauses cannot be preposed was pointed out to me by John Ross. Care should be taken to give these sentences "normal" intonation, because heavy stress or pauses alter acceptability judgments in ways I don't know how to predict.

*By shooting him John methodically assassinated
the Premier.

We will now return to 'subject' by-clauses and consider sentences where the by-clause contains an agent. This was postponed because such sentences are in general ambiguous. The by-clause can be interpreted either as a 'subject' or as a 'method' by-clause. Consider the sentence

John annoyed Mary by breaking the dish.

Suppose that breaking the dish was intentional. Then the by-clause contains an agent. Now the whole sentence is ambiguous, either expressing purpose or not. If it does not express purpose, the main sentence subject, John, is not an agent, and so we are dealing with a 'subject' by-clause. If John is an agent, we have a 'method' by-clause. This observation can now be tested in several ways. Starting from the observed ambiguity of the sentenee, we observe that it loses this ambituity when submitted to any of the agent tests. E.g.,

Annoy Mary by breaking the dish!

Now, the by-clause is only 'method'. When the by-clause is preposed, we should get only the 'subject' interpretation.

By breaking the dish John annoyed Mary

John broke the dish, thereby annoying Mary.

The prediction seems to me to be borne out.

By-clauses which are interpretable as 'subject' are also interpretable as 'method' unless some of the requirements for 'method' by-clauses are not met. If either the main sentence or the by-clause does not have an agent, or if the by-clause is preposed, then the 'method' reading is out. An instance where the main sentence does not have an agent is provided by the verb necessitate, whose subject cannot be an agent.

John necessitated our withdrawal from the fence
by coughing.

*Harry persuaded John to necessitate our withdrawal
from the fence by coughing. (Where John, not
Harry, is the understood subject of cough.)

The following chart summarizes what has been said so far about the four types of by-clauses.

	'enabling'	'cause'	'subject'	'method'
Main sentence subject is an agent	-	-	-	+
Main sentence verb is stative	±	±	-	-
By-clause subject is an agent	±	±	±	+
By-clause verb is stative	±	±	±	-

The plus, of course, means "yes"; the minus means "no". The terms 'main sentence subject' and 'main sentence verb' refer to surface constituents; that is, the claim that the main sentence subject is not an agent when there is an 'enabling' by-clause does not depend on the theory that succeed in is deleted. There is no agent, because sentences with 'enabling' by-clauses fail the agent tests. Similarly, it is claimed that the main sentence verb in sentences with 'enabling' by-clauses can be stative or non-stative. This would not be true before succeed in is deleted, since succeed in is stative. If the theory about the deletion of 'succeed in' is correct, and if we classified by-clauses before this deletion takes place, then the 'enabling' by-clause column would be eliminated entirely and subsumed under 'cause' by-clauses.

In the diagram given at the beginning of this section, 'method' and 'reason' constitute the category 'manner'. The motivation for this is that both types express manner. To see this more clearly, notice that 'method' and 'reason' by-clauses can both be questioned by how. For each type of by-clause:

How did John avoid the draft? By being eight feet tall.
= What enabled John to avoid the draft? ('enabling')

How did John break his leg? By falling down.
= What caused John to break his leg? ('cause')

How did John annoy Mary? By being tall.

= What annoyed Mary? ('subject')

How did John assassinate the Premier? By shooting him.
= By what method did John assassinate the Premier? ('method')

In view of this, it seems appropriate to call these by-clauses manner adverbs. 'Passive' by-clauses, however, are not manner adverbs, since they do not express manner and cannot be questioned with how. The following examples illustrate 'passive' by-clauses and the fact that they cannot be questioned.

John was annoyed by Harry's setting fire to the house.
How was John annoyed? *By Harry's setting fire to the house.

Their departure was delayed by John's locking the door.
How was their departure delayed? *By John's locking the door.

John was overwhelmed by having been chosen as secretary.
How was John overwhelmed? *By having been chosen as secretary.

Another difference between 'passive' and 'manner' by-clauses is that the subjects of 'passive' by-clauses can be expressed and can be different from the main sentence subject, as is shown above. This is not true of 'manner' by-clauses, with certain exceptions that will be noted in section 5.

It seems fairly obvious that 'passive' by-clauses result from application of the passive transformation to a sentence with a sentential subject. The sources of the above sentences with 'passive' by-clauses are thus

Harry's setting fire to the house annoyed John.
John's locking the door delayed their departure.

Having been chosen as secretary overwhelmed John.

The fact that 'passive' by-clauses cannot be questioned with how is explicable on the assumption that only deep structure constituents can be questioned. Since the by is added by transformation, 'passive' by-clauses are not deep structure constituents. By this reasoning 'manner' by-clauses are deep structure constituents. So any attempt to derive 'passive' and 'manner' by-clauses in the same way must fail.

There is another way in which the different status of 'passive' and 'manner' by-clauses is reflected. We have seen that there are a number of restrictions on the occurrence of 'manner' by-clauses with respect to the subject and verb of the main sentence and the by-clause. None of these restrictions applies to 'passive' by-clauses. The 'passive' by-clause subject can be an agent or not, and the by-clause verb can be stative or non-stative. The main sentence verb can also be stative or non-stative (entail vs. annoy). Of course, the subject cannot be an agent, but this is automatic.

Having given various ways to differentiate the different types of by-clauses, we will henceforth confine ourselves to 'method' and 'subject' by-clauses. The categories 'method' and 'subject' by-clause correspond to the categorization of manner adverbs discussed in section 2. 'Method' by-clauses are manner adverbs that require agents, like enthusiastically, carefully. Manner adverbs like quickly, gradually do not require agents, and in this they are like 'subject' by-clauses. But quickly, etc., do allow agents, while 'subject' by-clauses do not. So another way to look at it is that 'subject' and 'method' by-clauses taken as a single category are like quickly, etc. in occurring with or without an agent. In section 10 it will be argued that 'subject' and 'method' by-clauses do constitute a single category, but in the meantime we will focus on the differences between them.

4. The like-subject requirement.

We have progressively narrowed the scope of our inquiry from how purpose is represented in deep structures to the relationship of agents to 'method' and 'subject' _by_-clauses. We herewith restrict our attention to a consideration of one peculiar fact about these two types of _by_-clauses. This is that the understood subject of the _by_-clause is the same as the main sentence subject. In this section we will enumerate various thinkable ways of accounting for this fact.

First, to the fact. Sentences in which the like-subject condition is not fulfilled are unacceptable.

*John assassinated the Premier by Harry's shooting him. ('method')

There is some question as to whether this sentence is interpretable as containing an 'enabling' _by_-clause. I myself find it unacceptable under any reading, but at least it seems clear that the 'method' reading is no good.

*John annoyed Mary by Harry's being tall. ('subject')

Again, perhaps there is an 'enabling' interpretation. I think not. In any case, the reading as 'subject' _by_-clause is impossible.

How, then, can this like-subject requirement be expressed? First, notice that whatever solution we choose, at some point in the derivation the subject of the _by_-clause must be present, even if it must later be deleted. Otherwise, there would be no formal way to characterize the notion "understood subject of the _by_-clause." We can easily determine that there is an understood subject and in any particular instance, we can determine what it is. This intuition must be taken into account. If it were said that the _by_-clause had no subject at any place in the derivation, some formal device that is not provided for in current transformational theory would have to be found to characterize what is "understood."

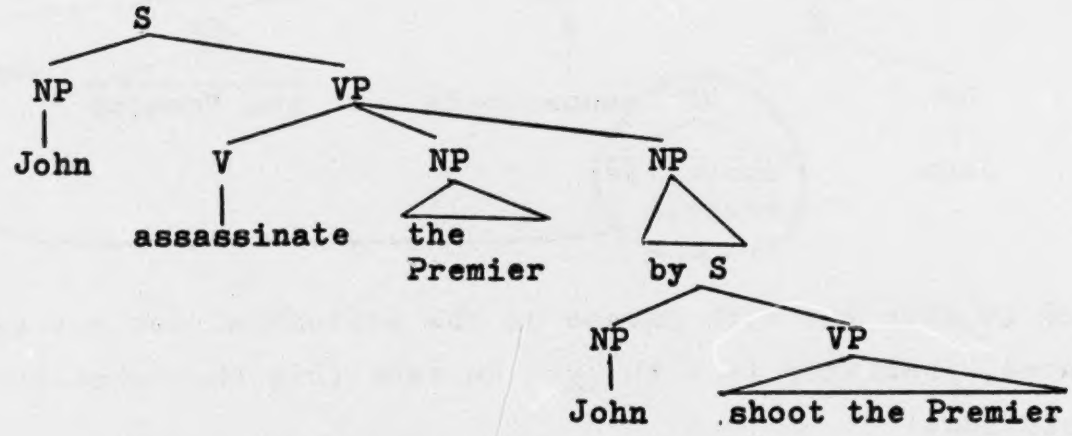
There seem to be two feasibilities for expressing the like-subject requirement. The first is postulating some constraint on sentences with 'method' and 'subject' by-clauses that blocks derivations in which the subjects are different. The second is to postulate a transformation that moves or copies something. Let's look at the first alternative.

There are several forms a constraint that blocks unlike subjects could have. It could be a constraint on deep structures, on surface structures, or a transformational constraint. For an account of what part deep and surface constraints play in grammar, see Perlmutter (op. cit.). George Lakoff has shown how obligatory identity may be accounted for by requiring deep structures to meet the structural descriptions of deletion transformations (see Lakoff, On the Nature of Syntactic Irregularity, NSF-16, Harvard Computation Laboratory, 1965, section V.) Whatever the nature of the constraint, such a solution supposes that the subjects are distinct in deep structure. To constrain two things to be identical there must be two things. Of course there might be such a constraint, even if the two subjects are not distinct in deep structure, that is if one of the subjects arose by moving or making a copy of the other. In the latter case, however, we would not say that the constraint had accounted for the like-subject requirement, so it would not be a "solution."

Making the assumption that the deep structures of sentences with the by-clauses correspond fairly directly with their surface structures, we can see what sort of deep structure the constraint solution entails. The sentence,

John assassinated the Premier by shooting him.,

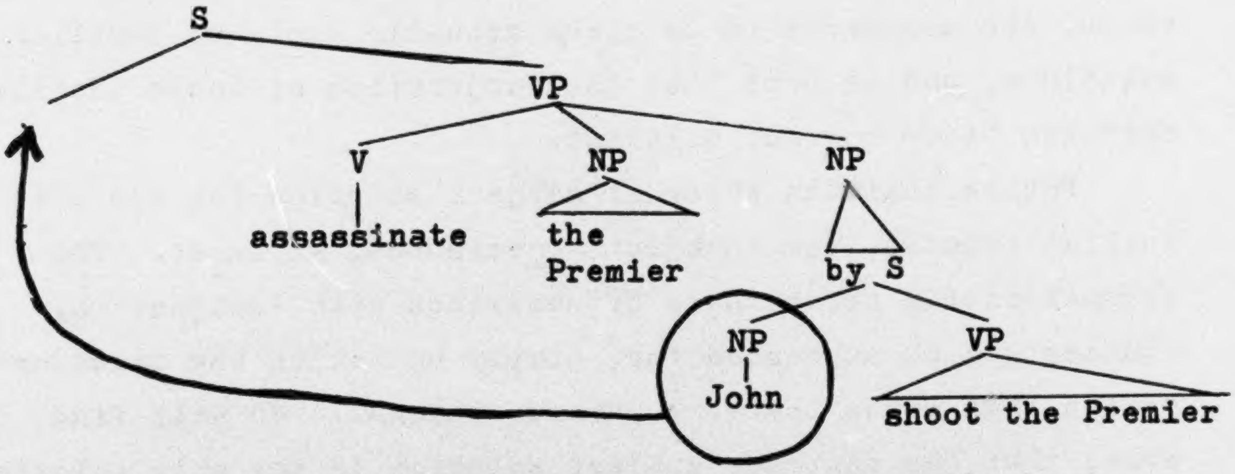
would have the deep structure


S
NP
VP
John
V
NP
NP
assassinate
the Premier
by S
NP
VP
John
shoot the Premier

(Tenses of verbs are not taken into account.)

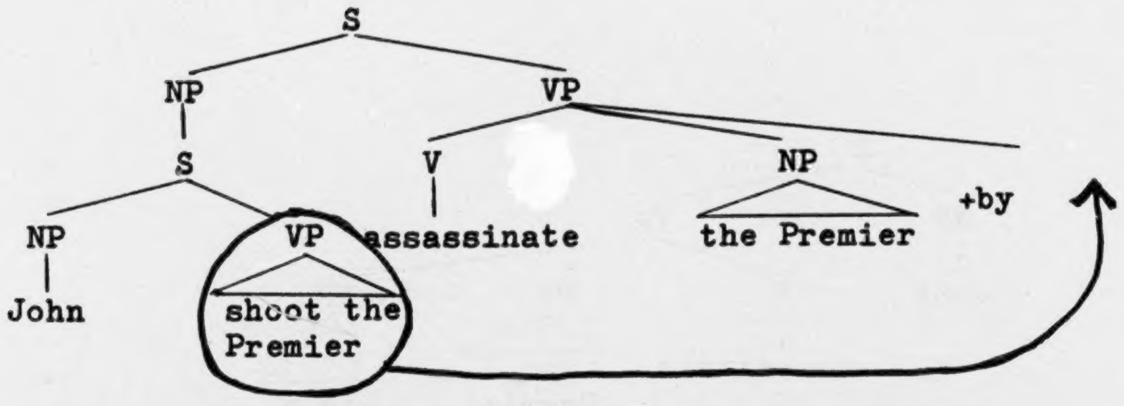
Since both subjects, John and John, are present in this deep structure, let us call the postulation of this sort of deep structure, along with whatever constraint and deletion transformation may be found appropriate, the 'two noun phrases solution'.

If the two subjects are not distinct, a simple solution is to posit a movement transformation and the following deep structure:


S
VP
V
NP
NP
assassinate
the Premier
by S
NP
John
VP
shoot the Premier

As the arrow indicates, John will be moved up from the by-clause to become the main sentence subject. This will be called the 'no subject solution.'

An equally simple solution is to start with



and to move the verb phrase of the sentential subject as indicated, prefixing it with by. We term this the 'abstract subject solution.'

Each of these three solutions uses only one transformation. Allowing more transformations multiplies the possible deep structures rapidly, so, preferring to let complications be forced on us by the facts, we will go no further in listing possible solutions. It is assumed henceforth that the two noun phrases solution, the no subject solution, and the abstract subject solution exhaust the possibilities. The only problem then is to choose among them. Of course, strictly speaking, this assumption is indefensible, but we may hope that more correct assumptions about deep structures will make no essential difference for the arguments that follow. In other words, the arguments to be given actually apply to families of solutions, and we hope that the conjunction of these families contains "the" correct solution.

Notice that the abstract subject solution has the most initial promise, for 'subject' by-clauses, at least. The characteristic paraphrases of sentences with 'subject' by-clauses can be accounted for, simply by making the transformation that moves the verb phrase optional. We will find, however, that the abstract subject solution is the only solution among the three that is to be rejected altogether.

The argument will proceed as follows. Section 5 discusses 'method' by-clauses. It is shown that the subjects must be guaranteed to be identical before any cyclical transformations apply. We then present evidence that the two noun phrases solution is correct for 'method' by-clauses.

Section 7 discusses 'subject' by-clauses. We show that the two noun phrases solution and the abstract subject solution are incorrect for 'subject' by-clauses.

5. 'Method' by-clauses.

The problem is to decide which of the solutions--two noun phrases, abstract subject, or no subject--is the correct one for 'method' by-clauses. Whichever solution we choose we must account for the fact that the following two sentences are paraphrases:

Someone assassinated the Premier by shooting him.
= The Premier was assassinated by being shot.[5]

It is apparent that the by-clause of the second sentence is not a 'passive' by-clause. If this by-clause were derived by application of the passive transformation, we would expect

*Being shot assassinated the Premier.

to be acceptable. In addition, by being shot can be questioned with how:

How was the Premier assassinated? By being shot.

Therefore it cannot be a 'passive' by-clause.

Consider now the derivation of

The Premier was assassinated by being shot.

Suppose that the abstract subject solution is correct. Then to account for the fact that the understood subject of *be shot* is *the Premier*, we postulate:

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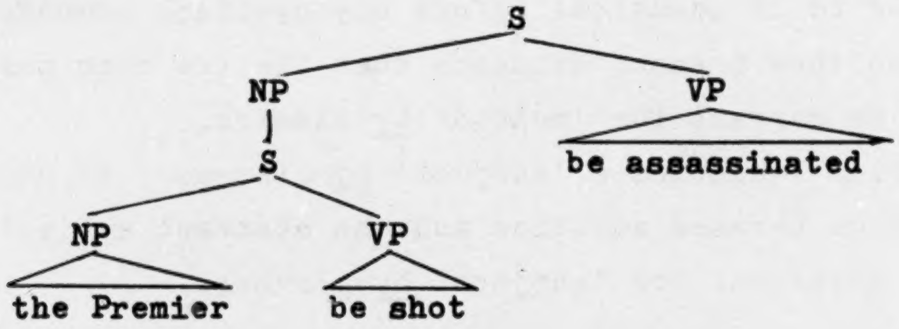
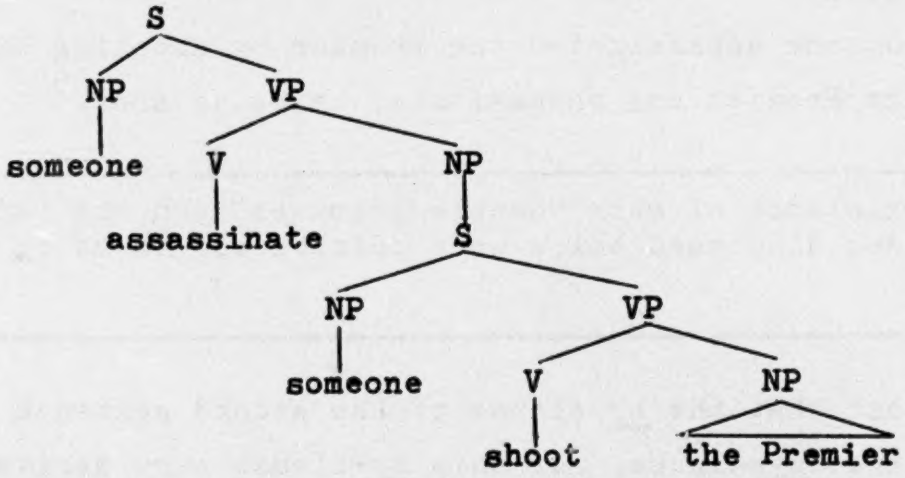
[5] The existence of such "double passives" and the "single passive" cases discussed below were pointed out to me by John Ross.


S
NP
VP
be assassinated
S
NP
VP
the Premier
be shot

A movement transformation converts this into the correct surface structure. But this cannot be the deep structure, since *be shot* and *be assassinated* are clearly passive. The ultimate source of the above tree must be:


S
NP
VP
someone
V
NP
assassinate
S
NP
VP
someone
V
NP
shoot
the Premier

This is clearly wrong, since the object of *assassinate* must be *the Premier*. Even if this were not clear, this deep structure is different from the deep structure that would underlie

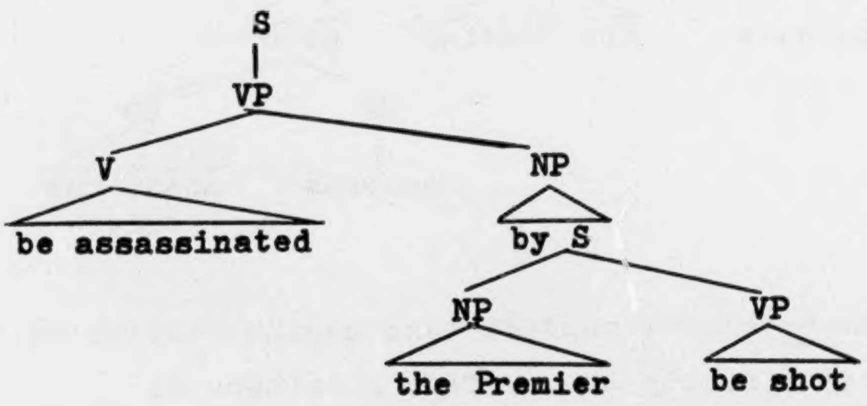
Someone assassinated the Premier by shooting him.

still assuming the abstract subject solution to be correct. Thus this solution leads to an incorrect result.

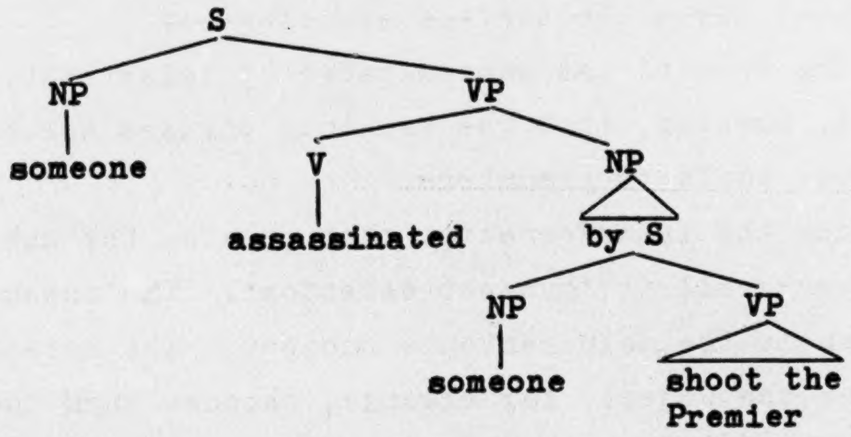
Similarly we can show that the no subject solution does not account adequately for "double passive" sentences. If the no subject solution were correct, the structure underlying

The Premier was assassinated by being shot.

would be

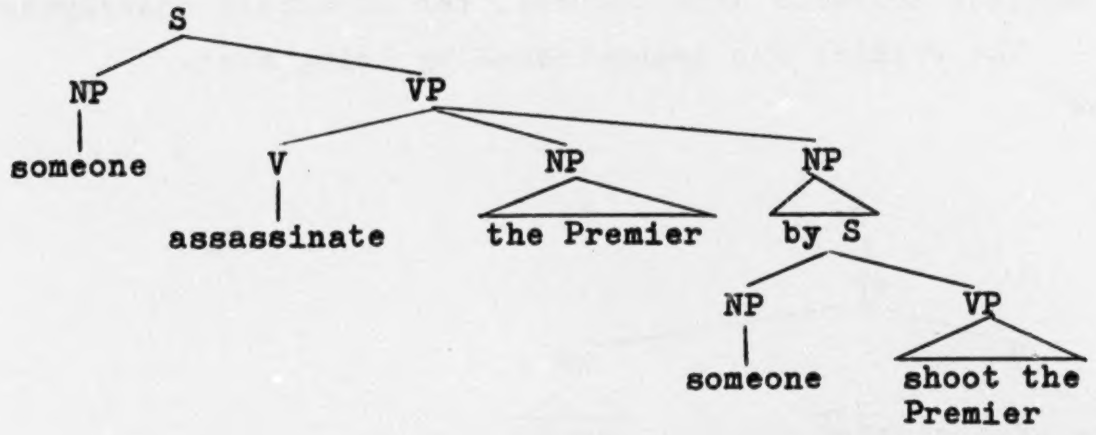

S
VP
V
NP
be assassinated
by S
NP
VP
the Premier
be shot

Undoing the results of the passive transformation, we get:


S
NP
VP
someone
V
NP
assassinated
by S
NP
VP
someone
shoot the Premier

Again, *the Premier* is not the object of *assassinate*, and the active and passivized sentences cannot be shown to have the same deep structure.

The two noun phrases solution, on the other hand, gives the same deep structure for both the active and the double passive cases, namely:



Deletion of the *by*-clause subject (and nominalization of the *by*-clause) gives directly the surface structure of

Someone assassinated the Premier by shooting him.

Applying the passive transformation to the *by*-clause and the main sentence, then deleting the *by*-clause subject (and *by someone* twice) gives the surface structure of

The Premier was assassinated by being shot.

To conclude, however, that the two noun phrases solution is the right one would be premature.

Consider the transformation that deletes the subject of the *by*-clause--call it 'subject-deletion'. The antecedent of the deletion is the main sentence subject. The antecedent could not be the object, for example, because then the subject of the *by*-clause in

?Someone assassinated the Premier by shooting himself.

could be *the Premier*. But this is an impossible interpretation. Now in

The Premier was assassinated by being shot.

the antecedent for subject-deletion, *the Premier*, is not the main sentence subject until after the passive transformation has applied to the main sentence. Therefore subject-deletion follows the passive transformation. Since the passive transformation is cyclical, subject-deletion cannot be pre-cyclical.[6]

It can be shown that sentences with 'method' by-clauses must meet the structural description of subject-deletion. If these sentences are marked to meet the structural description (i.e., marked as 'positive absolute exceptions', in Lakoff's terminology), the like-subject requirement in the double passive case will be accounted for. For example, the unacceptability of

?*The Premier was assassinated by a gun's being used.

is successfully predicted. This could not be accomplished by a deep structure constraint, or any mechanism that operates before the main sentence is passivized, because if the passive transformation had not applied, the above example would be perfectly acceptable. It would come out to be:

Someone assassinated the Premier by using a gun.

To put it another way, the like-subject deletion transformation deletes and takes as its antecedent derived subjects. Therefore marking sentences with 'method' by-clauses as positive absolute exceptions to subject-deletion correctly accounts for the like-subject requirement.

Besides the double passive case, there is another situation in which the deleted by-clause subject is a derived, rather than logical, subject. The fronting transformation can apply to the by-clause sentence before its subject is deleted. The fronting transformation is the rule which creates certain have sentences out of source sentences which do not contain have (see Lee, op. cit.). For example, fronting changes

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[6] That the passive transformation is cyclical is shown by Lakoff in "Deep and Surface Grammar" (unpublished, 1966). He also discusses the possibility of pre-cyclical and last-cyclical transformations and shows, in fact, that such exist.

A book is on the table.

to

The table has a book on it.

An example of a 'method' by-clause to which fronting has applied is

The Premier was assassinated by having someone give him a poisoned aspirin.

The passive transformation and fronting have both applied to the by-clause in

The Premier was assassinated by having a poisoned aspirin given (to) him.

In these cases, as well as the double passive case, not only are the derived subjects understood to be the same, but the logical subjects of the main sentence and the by-clause are also identical. Whoever assassinated the Premier is the same person that shot him or gave him a poisoned aspirin.[7] This identity of logical subjects explains the interpretation of certain by-clauses. The by-clause in

John assassinated the Premier by being given a gun.

cannot be a 'method' by-clause. This follows from the requirements that the logical and derived subjects of the main sentence and by-clause be the same. Since the logical and derived subjects of the main sentence are both John, the source for the 'method' by-clause would have to be the unacceptable

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[7] We should also consider the possibility that an organization, rather than an individual, is the agent. Perhaps in this case there is no strict identity between the logical subjects of the main sentence and by-clause.

?The Premier was assassinated (by the opposition party) by being shot (by a member or a hireling of the opposition party).

If such an interpretation is possible, I don't know what to make of it. Presumably the same non-identity is possible in the active case. Compare also:

Tom, Dick, and Harry conspired to assassinate the Premier by shooting him.

If they conspired together, Tom, Dick, and Harry need not have planned for each of them to actually pull the trigger.

*John was given a gun by himself.

Similarly, we can explain why the 'method' by-clause in

The Premier was assassinated by having someone give him a poisoned aspirin.

has only one interpretation. In isolation, the sentence

The Premier had someone give him a poison aspirin.

is ambiguous. Have can either be the causative have, in which case the Premier is the logical subject, or have can be the have introduced by the fronting transformation. In the 'method' by-clause only the latter reading is possible; the Premier is not the logical subject. If the logical subject of the by-clause were the Premier, the logical subject of the main sentence would also have to be the Premier. But

*The Premier was assassinated by himself.

is unacceptable.

Now the difficulty is that we cannot handle the required identity of the logical subjects in the same way as we have accounted for the identity of the derived subjects. The identity requirement for logical subjects must be expressed while they are still subjects, in other words before the passive or fronting transformations have applied. Requiring the subject of the by-clause to be deleted by subject-deletion cannot possibly account for the identity of the logical subjects, since subject-deletion follows the passive transformation. The requirement must be expressed before the passive transformation has applied. It appears that forcing sentences with 'method' by-clauses to meet the structural description of subject-deletion is necessary, but not sufficient to account for the like-subject requirement.

The argument given at the beginning of this section for the two noun phrases solution had to do with derived subjects rather than logical subjects. We now see that all that was in fact demonstrated was that objects of the main sentence and by-clause are distinct. We still know nothing about the deep structure subject(s). We do know, however, that if either the no subject or abstract subject solutions should turn out to be correct, the movement transformation each requires to create the apparent identity of subjects would have to precede the passive transformation.

It should be pointed out that subject-deletion is not sufficient to account for the absence of by-clause subjects. Consider the sentences

The Premier was assassinated by shooting him.

John was punished by taking away his rattle.

These are exceptions to the generalization that the derived subjects are the same. Here the antecedents of the understood by-clause subjects are the logical subjects of the main sentences. The by-clause subjects cannot have been deleted by subject-deletion, since subject-deletion applies after the passive transformation. At this point the antecedents are no longer the main sentence subjects. There are the same options as before for ensuring the absence of these by-clause subjects--one of the movement transformations that go with the abstract subject and the no subject solutions, or another subject deletion transformation, which applies before the passive transformation rather than after.

Notice that sentences like the two examples above do not meet the structural description of subject-deletion, yet are acceptable. This may be merely a notational problem, or it may indicate that the appropriate way to ensure that the by-clause subject be deleted is by means of a surface constraint which blocks by-clauses with subjects. The constraint could not be applicable to 'passive' by-clauses, which may have expressed subjects. For the present we retain the absolute exception view and assume that the structural description of subject-deletion is stated with a parenthesized subject. Thus subjectless by-clauses will meet the structural description of subject-deletion and undergo it vacuously.

Although these arguments lead to no definite conclusion, it can be inferred on other grounds that the two noun phrases solution is the correct one. With the other two solutions the surface subject and the verb of the main sentences are not constituents of the same sentence. In this case we would expect no selectional restrictions between subject and verb, since selectional restrictions seem to be limited in scope mainly to constituents of the same sentence. The fact that there are selectional restrictions is evidence for the two noun phrases solution. For instance, scatter requires a collective or plural subject:

> The crowd scattered by using every available exit.

And of course, the main sentence subject must be a thing that can have a purpose, ruling out expletives.

> *It assassinated the Premier by raining cats and dogs.

The restriction to animate subjects, however, does not count as evidence, since if the subject were not animate, the by-clause would not be termed 'method'. The word method itself presupposes an agent. Similar considerations convince us that the subject and verb of the by-clause go together in deep structure.

Suppose then that the two noun phrases solution is correct. Since the main sentence and by-clause subjects are distinct in deep structure, a transformation is required to delete the by-clause subject. As was pointed out above, subject-deletion does not suffice; another transformation which does the same thing as subject-deletion is needed. Call this transformation 'pre-subject-deletion'. Although it is not very compelling evidence, the existence of pre-subject-deletion seems to indicate the appropriate way to constrain the logical subjects to be identical. We can require sentences with 'method' by-clauses to meet the structural description of pre-subject-deletion, just as they must meet the structural description of subject-deletion. A deep structure constraint is of course still feasible, but at this point I think it is legitimate to doubt the existence of such constraints. The matter will be brought up again in section 9.

Notice that for the proposed solution to work, pre-subject deletion must be a precyclical transformation. If it were cyclical, the following derivation would be possible:

Someone assassinated the Premier by the Premier shoot someone

S_1, passive: Someone assassinated the Premier by someone be shot by the Premier

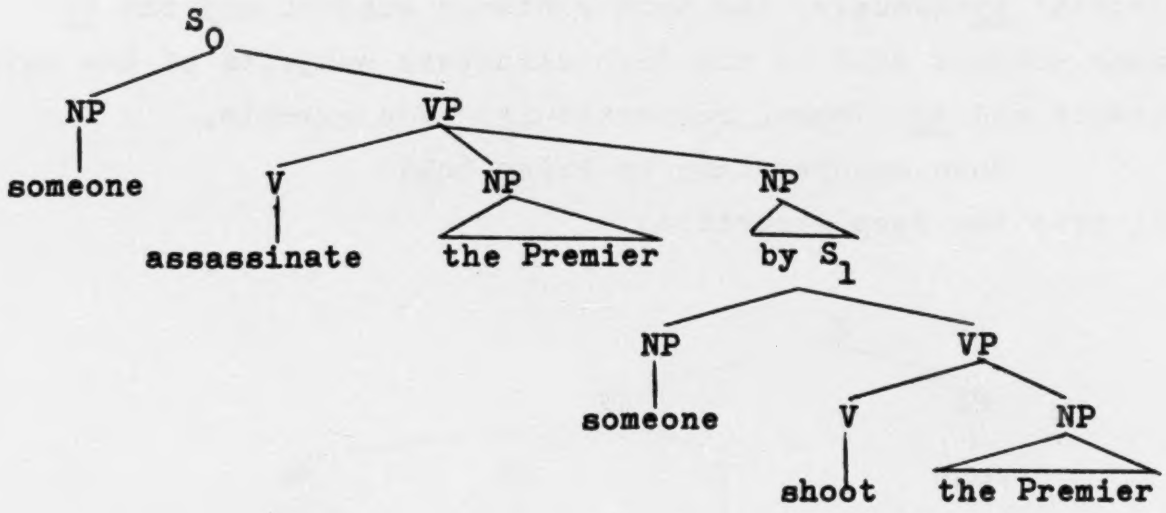
S_0, pre-subject-deletion: Someone assassinated the Premier by be shot by the Premier

S_0, passive: The Premier was assassinated by someone by the shot by the Premier

other rules: *The Premier was assassinated by being shot by him.

To summarize, we give the derivation of

The Premier was assassinated by being shot.


S_0
NP
someone
VP
V
assassinate
NP
the Premier
NP
by S_1
NP
someone
VP
V
shoot
NP
the Premier

precycle	
pre-subject-deletion:	Someone assassinate the Premier by shoot the Premier.
cycle	
S_1, passive:	Someone assassinate the Premier by the Premier be shot.[8]
S_0, passive:	The Premier be assassinated by someone by the Premier be shot.
S_0, subject-deletion:	The Premier be assassinated by someone by be shot.
other rules:	The Premier was assassinated by being shot.

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[8] We have supposed that the passive transformation can apply to a subjectless sentence.

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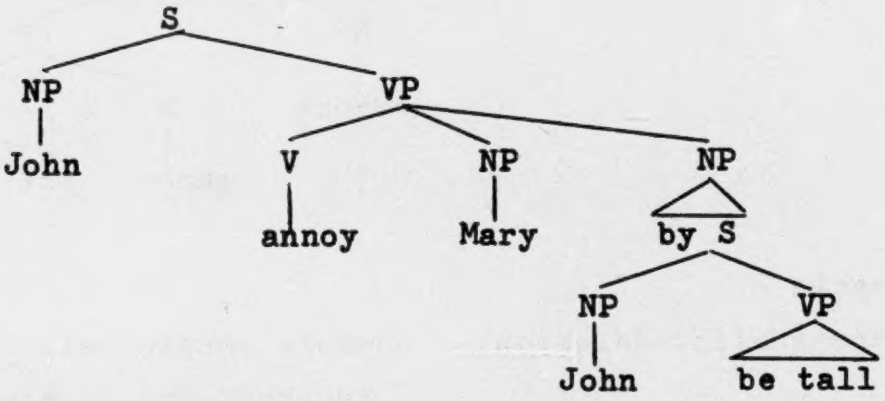
6. 'Subject' *by*-clauses.

We will now consider how to account for the like-subject requirement with 'subject' *by*-clauses. We first show that the solution chosen for 'method' *by*-clauses is inappropriate for 'subject' *by*-clauses.

Supposing the two noun phrases solution to be correct for 'subject' by-clauses, the main sentence subject and the by-clause subject will be the deep structure subjects of the main sentence and by-clause, respectively. For example,

John annoyed Mary by being tall.

will have the deep structure:



But the understood subject of the by-clause is not, in general, the deep structure subject; nor is the main sentence subject there in deep structure. Consider the sentences:

John annoyed them by seeming to disregard their opinions.
John surprised us by being easy to please.
The car delayed our departure by beginning to act up.
John impressed us by seeming to begin to be easy to please.

In each of these sentences the deep structure subject of the by-clause is a sentential noun phrase. These subjects would be approximately the following:

John disregard their opinions.
Someone please John.
[[Someone please John] be easy] begin.

Thus although the understood subjects of the by-clauses in these examples are simple noun phrases, the deep structure subjects are more complicated. Therefore the understood subjects are not deep structure subjects of the main verb.

Furthermore, if the identity of subjects in

John impressed us by seeming to begin to be easy to please.

were to be accounted for by requiring this sentence to undergo pre-subject-deletion, this would imply that certain transformations precede pre-subject deletion; namely the transformations which convert

[[[Someone please John] be easy] begin] seem.

to

John seemed to begin to be easy to please.

These transformations would then have to be precyclical, since pre-subject-deletion is precyclical. This is certainly a false conclusion. For example, the transformation[9] which converts the structure underlying

The vat's being filled slowly began.

to the structure underlying

The vat slowly began to be filled.

must follow the passive transformation in order of application. By the same token these transformations would have to precede the movement transformation associated with the abstract subject and no subject solutions. That is, if we decide on one of these solutions, the movement transformation it entails will have to be cyclical.

The noun phrase which appears as the main sentence subject is revealed not to be the deep structure subject by the absence of selectional restrictions between it and the verb of the main sentence. With some exceptions to be discussed later, any noun phrase whatever may be the surface subject of verbs like _annoy_ which take 'subject' _by_-clauses. The exceptions do not involve violation of selectional restrictions. However there may be selectional restrictions between the understood subject and the verb of the _by_-clause. This is predicted by the abstract subject and no subject solutions.

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[9] 'it-replacement'. See Rosenbaum, The Grammar of English Predicate Complement Constructions, MIT Press, 1967.

Further evidence that the main sentence subject is not a deep structure subject is provided by the sentence

It annoyed John by raining all day.

It should be said at the outset that there are many speakers of English who do not accept this sentence, or sentences like it. For some, including me, it is perfectly acceptable. The thing to note is that the _it_ is not a pronoun replacing some definite noun phrase, as is shown by the unacceptability of

*The weather annoyed John by raining all day.

Rather the _it_ is the expletive associated with meteorological expressions, like _rain_. This meteorological _it_ must not be introduced into deep structure as the subject of a verb like _annoy_, which is not meteorological. The appearance of this _it_ as the subject of _annoy_ in the above example is plainly due to the fact that the _by_-clause contains a meteorological predicate. Without the _by_-clause, _it_ is interpreted as the definite pronoun:

It annoyed John.

People who do not accept meteorological _it_ with a 'subject' _by_-clause seem to interpret

It annoyed John by raining all day.

in the same way I interpret

*John was annoyed at it for raining all day.

This leads one to suspect that the sentence

John annoyed Mary by being tall.

has two distinct readings. Either Mary was annoyed at John personally (in which case she was being rather unreasonable), or she was merely annoyed at the fact that he was tall. In the latter reading only, is there a paraphrase relation with

John's being tall annoyed Mary.

There are probably some special restrictions on meteorological it for all speakers. Much worse for me than

It annoyed John by raining all day.

is

*It persuaded John not to have the picnic by raining cats and dogs.

In any case, there is enough evidence to support the conclusion that the two noun phrases solution is wrong for 'subject' by-clauses. We must now choose between the two remaining alternatives--the abstract subject and the no subject solutions.

In the no subject solution the by-clause is a deep structure constituent, while in the abstract subject solution it is not--the by is added by transformation. We were able to explain why 'passive' by-clauses cannot be questioned by assuming that only deep structure constituents can be questioned. Since 'subject' by-clauses can be questioned with how, this assumption forces us to choose the no subject solution. Similarly, the restriction that 'subject' by-clauses, like 'method' by-clauses, only occur with non-stative verbs leads us to believe that 'subject' by-clauses are deep structure constituents. If we choose the no subject solution, this restriction falls together with the restriction on 'method' by-clauses and manner adverbs in general. (As we will see in section 10, 'cause' and enabling' by-clauses are not exceptions to this.) If, on the other hand, we chose the abstract subject solution, we would have to explain somehow why

John's having appointed his brother smacks of nepotism.
John's having red hair ties in with his pugnacity.

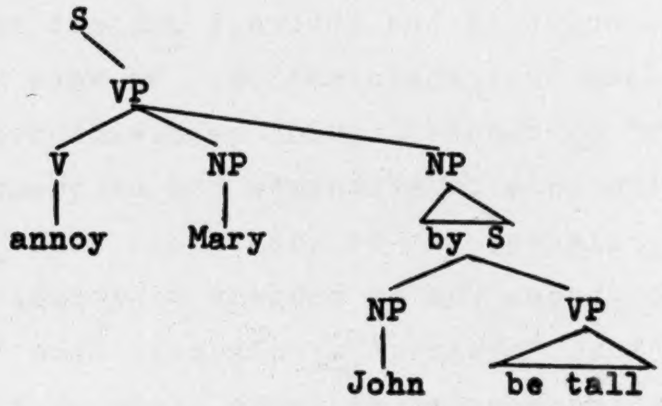
cannot be converted to

*John smacks of nepotism by having appointed his brother.

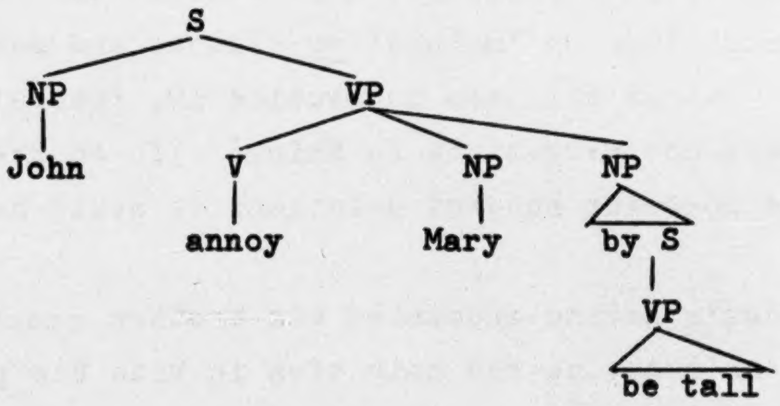
*John ties in with his pugnacity by having red hair.

We conclude that the no subject solution is correct. The transformation that moves the by-clause subject up to become the main sentence subject we will call 'extraction'. As was noted above, extraction is a cyclical transformation. Another transformation is required for shifting the entire by-clause into subject position. This transformation, which we term 'adverb-to-subject', accounts for the characteristic paraphrases of sentences with 'subject' by-clauses. We assume that by is deleted by an independently motivated rule.

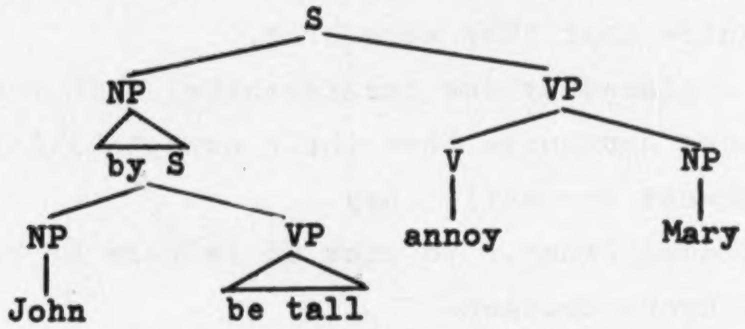
To summarize the conclusions of this section, we give the following derivations.



extraction:



other rules: John annoyed Mary by being tall.
When applied to the same deep structure, adverb-to-subject gives



Deletion of by and nominalization gives

John's being tall annoyed Mary.

The adverb-to-subject rule is like Fillmore's rule that preposes instrumental adverb (Fillmore, op. cit.), as in

The hammer broke the window.

where the hammer is an instrument.

Additional justification for the conclusions of this and the preceding section are given in section 7.

7. Cross-over evidence.

In a sentence with a 'subject' by-clause, the subject and object of the main sentence may not be coreferential. The following are examples of 'subject' by-clauses:

John reminded Mary to pick up lettuce by having his fingers crossed.

= John's having his fingers crossed reminded Mary to pick up lettuce.

John satisfied the doctors that he was drugged by feeling no pain.

= John's feeling no pain satisfied the doctors that he was drugged.

John persuaded Mary to drive home by being drunk.

= John being drunk persuaded Mary to drive home.

They persuaded the guide that they were lost by coming across their own footprints.

= Their coming across their own footprints persuaded the guide that they were lost.

When the object is replaced by one coreferential with the subject, the _by_-clause sentences lose their acceptability, although the paraphrases are still okay.

*John reminded himself to pick up lettuce by having his fingers crossed.

John's having his fingers crossed reminded him to pick up lettuce.

*John satisfied himself that he was drugged by feeling no pain.

John's feeling no pain satisfied him that he was drugged.

*John persuaded himself (not) to drive home by being drunk.

John's being drunk persuaded him (not) to drive home.

*They persuaded themselves that they were lost by coming across their own footprints.

Their coming across their own footprints persuaded them that they were lost.

The unacceptability of these _by_-clause sentences can be accounted for by Postal's cross-over principle (P. Postal, "The Cross-Over Principle," unpublished, 1968). The cross-over principle says that in certain situations it is forbidden to move a noun phrase over a noun phrase coreferential with the noun phrase being moved. Since in our formulation the subject of the _by_-clause is moved over the object by extraction, the unacceptability of those _by_-clause sentences is satisfactorily handled. The important point is that if we were to choose either the abstract subject or the two noun phrases solution such an explanation would not be forthcoming. In neither of these solutions has the main subject been moved.

Several other facts follow from the impossibility of moving the by-clause subject over a coreferential main sentence object. 'Subject' by-clauses can also be interpreted as 'method' by-clauses if the by-clause can have an agent and the main sentence subject can be an agent. So changing the verbs of the by-clauses in the first examples to non-stative verbs which take agents makes the sentences ambiguous.

> John reminded Mary to pick up lettuce by crossing his fingers.
>
> John satisfied the doctors that he was drugged by looking at his pupils.
>
> John persuaded Mary to deive home by feeling his pulse.
>
> They persuaded the guide that they were lost by studying the map.

When the object is changed to a coreferential one, this ambiguity disappears; the interpretation of the by-clause is as 'method'.

> John reminded himself to pick up lettuce by crossing his fingers.
>
> John satisfied himself that he was drugged by looking at his pupils.
>
> John persuaded himself (not) to drive home by feeling his pulse.
>
> They persuaded themselves that they were lost by studying the map.

The fact that the 'method' interpretation is possible confirms the choice of the two noun phrases solution for 'method' by-clauses; in the two noun phrases solution the subject has not been moved and so no cross-over violation is predicted. Since these last examples have by-clauses that are unambiguously 'method', we would expect that they cannot be preposed. In fact though, they are not unambiguous; there is also an 'enabling' interpretation. When the by-clauses are preposed the 'enabling' interpretation is the only one possible:

By crossing his fingers John reminded himself to pick up lettuce.

By looking at his pupils John satisfied himself that he was drugged.

By feeling his pulse John persuaded himself (not) to drive home.

By studying the map they persuaded themselves that they were lost.

Recall, however, that the subjects of sentences with 'enabling' by-clauses cannot be agents. So when a manner adverb that requires an agent subject is added to these sentences, they become unacceptable. If the by-clause is not preposed, the 'method' interpretation is still possible and it is okay to add the manner adverb.

John wisely reminded himself to pick up lettuce by crossing his fingers.

*By crossing his fingers John wisely reminded himself to pick up lettuce.

*John crossed his fingers, thereby wisely reminding himself to pick up lettuce.

John carefully satisfied himself that he was drugged by looking at his pupils.

*By looking at his pupils John carefully satisfied himself that he was drugged.

*John looked at his pupils, thereby carefully satisfying himself that he was drugged.

John stupidly persuaded himself to drive home by feeling his pulse.

*By feeling his pulse John stupidly persuaded himself to drive home.

*John felt his pulse, thereby stupidly persuading himself to drive home.

They methodically persuaded themselves that they were lost by studying the map.

*By studying the map they methodically persuaded themselves that they were lost.

*They studied the map, thereby methodically persuading themselves that they were lost.

One difficulty in interpreting the cross-over evidence is that application of the adverb-to-subject rules does not produce violations. John crosses over John in

John's having his fingers crossed reminded him to pick up lettuce.

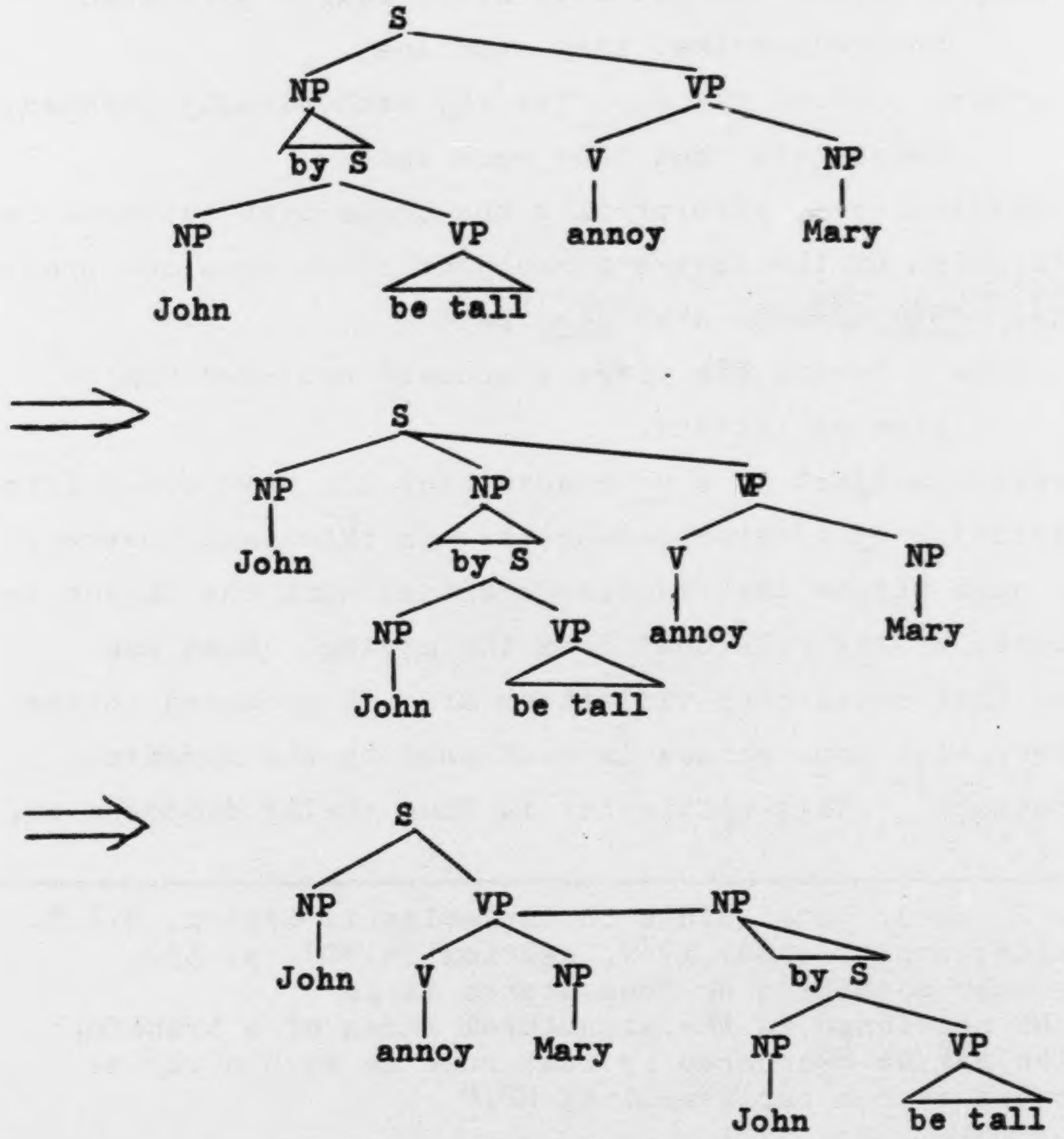
The sentential subject is a by-clause that has been moved into subject position by adverb-to-subject. In this case however, the moved noun phrase that is coreferential with the object is not mentioned by the rule that does the moving. Ross has discovered that cross-over violations are not produced unless the coreferential noun phrase is mentioned by the movement transformation.[10] This difficulty is thus easily disposed of.

---

[10] J. R. Ross, Constraints on Variables in Syntax, M.I.T. dissertation, unpublished; 1967, section (4.30), p. 132. The cross-over condition as Ross states it is

> "No NP mentioned in the structural index of a transformation may be reordered by that rule in such a way as to cross over a coreferential NP."

The fact that the moved noun phrase must be mentioned in order to produce a violation prevents us from reformulating the abstract subject solution so that it works. The data in previous sections is not inconsistent with the following formulation: 'Subject' by-clauses are from manner adverbs in subject position. To produce the characteristic paraphrases of 'subject' by-clause sentences, the by is deleted. E.g., by John's being tall annoyed Mary becomes John's being tall annoyed Mary. The by-clause version is given by first sister-adjoining a copy of John to the by-clause, then moving the by-clause to the end of the verb phrase. In pictures:


S
NP
VP
by S
V
NP
NP
VP
annoy
Mary
John
be tall
⟹
S
NP
NP
VP
John
by S
V
NP
NP
VP
annoy
Mary
John
be tall
⟹
S
NP
VP
NP
John
V
NP
by S
annoy
Mary
NP
VP
John
be tall

The subject of the by-clause, John, is then deleted by subject-deletion. In this formulation the subject of the by-clause is moved over the main sentence object. However, the rule that moves the *by*-clause to the end of the verb phrase would not mention the *by*-clause subject, and so the cross-over violations would not be predicted. Notice that we cannot save this formulation by saying that the cross-over principle restricts deletions rather than movements. One might wish to say that no coreferential noun phrase may come between a deleted noun phrase and its antecedent. This would be in conflict with what happens in the 'method' *by*-clause. The subject of a 'method' *by*-clause can be deleted by the main sentence subject even when the intervening object is coreferential.

Another difficulty with the cross-over evidence can be resolved in a similar fashion. We must account for why

John satisfied the doctors that he was drugged by
feeling no pain.

is acceptable in spite of the fact that the *by*-clause subject, *John*, is moved over the coreferential subject of the *that*-clause. The explanation lies in an extension of Ross's mention proviso to the cross-over principle. In order to produce a violation, the two coreferential noun phrases must both be mentioned in the structural index of the movement transformation. The extraction transformation must mention the direct object and the *that*-clause as a whole, but it does not mention the subject of the *that*-clause or any other noun phrase contained in the *that*-clause or the direct object. Extraction will be formulated in approximately the following fashion:

$$\begin{array}{lllll} X, & V\ NP\ (NP) & by, & NP, & V\ Y \rightarrow \\ 1 & 2 & 3 & 4 & 5 \\ 1 & 4+2 & 3 & \emptyset & 5 \end{array}$$

Extending the mention limitation on the cross-over principle to include noun phrases not moved is, I believe, implicit in

Postal's discussion of "constant movement" ransformations (Postal, op. cit.). The extension is intended to replace Postal's "clause-mate condition". Variables in structural descriptions which are "crucial" rather than merely "abbreviatory" are to be regarded as implicitly mentioning all the noun phrases included in the strings they represent.

An apparent exception to what has been said about crossover violations is provided by the following sentence:

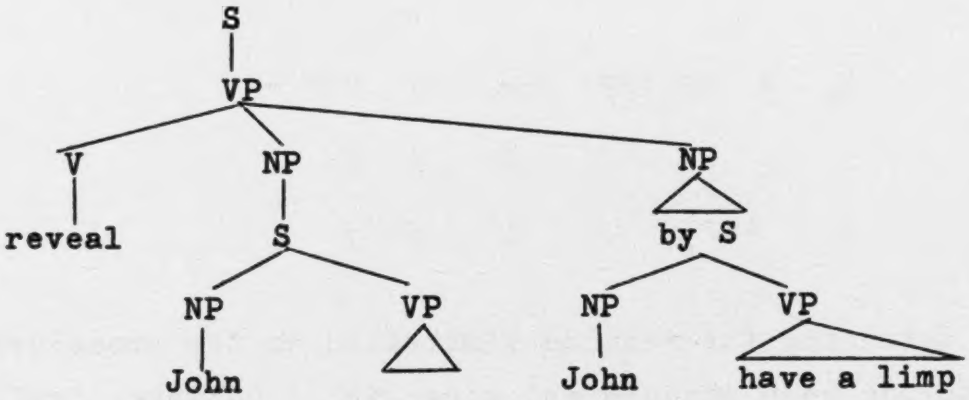
John revealed himself to be the culprit by having a limp.

Apparently _John_ has been moved across _himself_. The noun phrase represented by _himself_, however, is not the object of _reveal_ in deep structure. It becomes the object of _reveal_, by the operation of the subject-raising transformation, which moves the subject of a complement sentence up into the verb phrase.[11]

This sentence works like the others, then, if we order extraction before We must also allow the verb phrase of _reveal_'s object complement to be unspecified in deep structure and to be deleted to handle

John revealed himself by having a limp.

The derivation of this is



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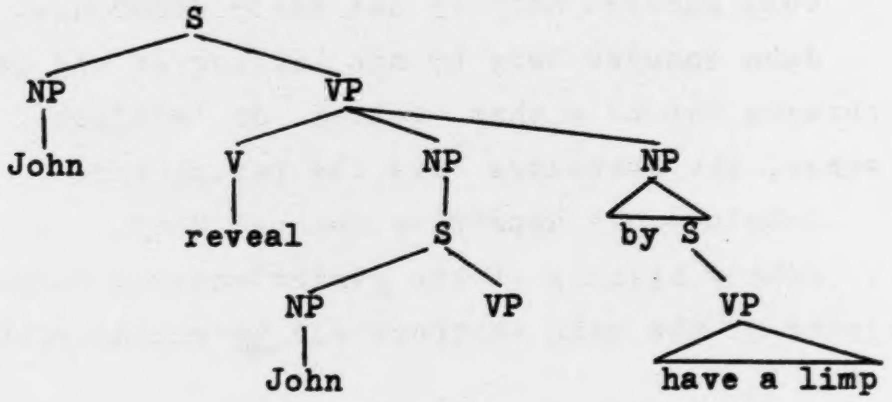
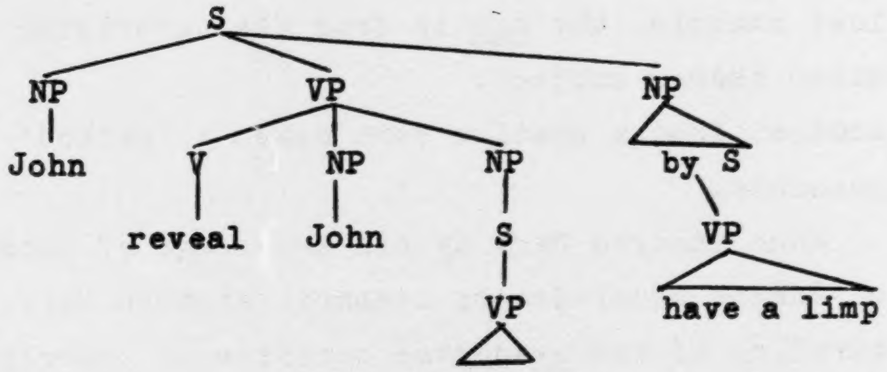
[11] See Paul and Carol Kiparsky, "Fact," to appear in Bierwisch and Heidolph (eds.), _Recent Advances in Linguistics_ (Mouton).

extraction:


S
NP
VP
John
V
NP
NP
reveal
S
by
S
NP
VP
VP
John
have a limp

subject raising:


S
NP
VP
NP
John
V
NP
NP
by
S
reveal
John
S
VP
VP
have a limp

8. Reformulation of extraction.

There is evidence that extraction is a copying rather than a movement transformation. So far we have considered only 'by-clauses', the term having been defined to include only phrases of the form by plus gerundive nominal. Phrases which consist of by plus action or derived nominals[12] seem to work in much the same way as by-clauses, except for retaining their subjects. For example in

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[12] The distinction gerundive/action nominal is from R. B. Lees, The Grammar of English Nominalizations, Mouton, 1966, p. 64-68. I use the distinction only in its formal sense, with no implication that the gerundive nominal cannot refer to actions, or that the action nominal always refers to actions.

John annoyed Mary by his early departure.

John annoyed Mary by his killing of the gander.

the by-phrases can be either 'method' or 'subject'. In the latter sense, the sentences have the paraphrases

John's early departure annoyed Mary.

John's killing of the gander annoyed Mary.

The subjects of the main sentence and by-phrase must be identical:

*John annoyed Mary by Harry's early departure.

*John annoyed Mary by his ouster.

In the last example, the his is from the underlying object of oust, rather than a subject.

A nominal from a stative verb makes a 'method' interpretation impossible:

John annoyed Mary by his knowledge of Sanskrit.

= John's knowledge of Sanskrit annoyed Mary.

Naturally, if the by-phrase contains no underlying sentence, there is no subject to agree with the main sentence subject, so the by-phrase cannot be by plus a simple genitive.

*John annoyed Mary by his watch.

In addition, by plus relative clause constructions can function like 'subject' by-clauses; apparently, though, not like 'method' by-clauses:

John annoyed Mary by the terrible things he said.

= The terrible things John said annoyed Mary.

John impressed Mary by the watch that he had.

= The watch that John had impressed Mary.

There must still be agreement between the main sentence subject and a subject somewhere in the by-phrase:

*John annoyed Mary by the terrible things that Harry said.

An interesting question which we will not pursue is how far down in the by-phrase the agreeing subject may be.

If extraction is a copying transformation, there is an apparent conflict with the cross-over evidence presented in the last section, since the cross-over restriction applies to movement transformations. However, copying transformations are also restricted by the cross-over principle, as the following example shows:

John had himself in his car.

This sentence is unambiguously causative, whereas sentences of this form are generally ambiguous. For instance

John had a dog in his car.

is either causative, or it is a paraphrase of

A dog was in John's car.

In the latter reading, it is derived by application of the fronting transformation, which copies John out of John's car. But fronting cannot apply in this way to

John was in his (John's) car.

The subject of the sentence cannot be copied because of a general restriction on fronting. The John can't be copied out of John's car because of the cross-over principle.

Since extraction copies, the subjects of by-clauses must be deleted by some additional rule. The deletion can be accomplished by subject-deletion--the rule needed to delete derived subjects of 'method' by-clauses. Just as sentences with 'method' by-clauses must meet the structural description of subject-deletion, so must sentences with 'subject' by-clauses. The situation where the subjects could be different in a 'subject' by-clause sentence arises when the passive transformation applies to the main sentence.

annoy Mary by someone be tall
extraction: Someone annoy Mary by someone be tall
passive: Mary be annoyed by someone by someone be tall
subject deletion: blocks

Thus the sentence

Mary was annoyed by being tall.

has only one interpretation--as containing a passive *by*-clause. It cannot also be interpreted as having a 'subject' *by*-clause with the understood subject *someone*. An interpretation as a 'subject' *by*-clause with the understood subject *Mary* is blocked by the cross-over restriction.

9. Subject-deletion.

The subject-deletion transformation is involved in the derivations of both 'subject' and 'method' *by*-clauses. The subjects of the two types of *by*-clauses must undergo subject-deletion, or, to put it another way, sentences with either type of *by*-clause are positive absolute exceptions to subject-deletion. In this section it will be argued that there is independent motivation for the subject-deletion transformation inasmuch as it falls together with the transformation equi-NP-deletion.[13]

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[13] This is Rosenbaum's 'identity erasure' transformation (op. cit.). The term 'equi-NP-deletion' is used by Lakoff and Ross in recent papers.

Equi-NP-deletion deletes the subjects of sentential object complements when they are identical with some noun phrase in the main sentence. For example, equi-NP-deletion (along with complementizer introduction and placement) changes

I expect [I leave].

to

I expect to leave.

The similarity between subject-deletion and equi-NP-deletion is obvious. They both delete subjects of sentential complements when the subjects are the same as a noun phrase in the main sentence. There is a crucial difference, however. The antecedent of the deleted noun phrase is the main sentence subject for subject-deletion, but for equi-NP-deletion the antecedent can be either the main sentence subject or the object, if there is one. (There are other possibilities for the antecedent--see Rosenbaum, op. cit., p. 17.) We will try to explain away this difference by showing the following: a) Equi-NP-deletion must be split up into two transformations. One version, pre-equi-NP-deletion, applies precyclically; the other, equi-NP-deletion, is cyclical. b) The antecedent for (cyclical) equi-NP-deletion is the main sentence subject. c) Pre-subject-deletion can be formulated so that the antecedent is determined in the same way as the antecedent for pre-equi-NP-deletion. So pre-subject-deletion falls together with pre-equi-NP-deletion.

There are two reasons for believing that equi-NP-deletion has to be split up. First, consider the identity requirement between the object of persuade and the subject of persuade's sentential complement. This requirement is discussed at length by Perlmutter (op. cit.). He gives the example

*I persuaded Clarabelle for Clem to plow the field. (p. 51)

Perlmutter argues that the identity requirement must be enforced on the main sentence before the passive transformation has a chance to apply to the sentential complement. This implies that the identity requirement must be enforced precyclically. We will accept this conclusion here without reviewing Perlmutter's arguments. But Perlmutter goes on to conclude that the identity constraint must be enforced at the level of deep structure. There is obviously another possibility, and that is that the identity requirement is enforced by a transformation that applies precyclically. That is, if there is a precyclical version of equi-NP-deletion, the identity requirement can be enforced by making sentences with persuade positive absolute exceptions to pre-equi-NP-deletion. Perlmutter rejects this other possibility "from silence". That is, since there is apparently no such transformation as pre-equi-NP-deletion, we must accept the deep structure constraint solution. However, looking at the matter another way, if there is evidence against the deep structure constraint solution, we would be forced to admit the existence of some precyclical transformation, such as pre-equi-NP-deletion, that "looks" at the noun phrases which are required to be identical. And, in fact, there is evidence that the deep structure constraint solution is wrong. If the sentential complement of persuade is a that-clause instead of an infinitival complement, the complement's subject need not be the same as the object of persuade---

> I persuaded Clarabelle that Clem should plow the field.

Thus Perlmutter's solution would force us to regard the differences between a that-clause and an infinitival complement, in this case at least, as deep structure differences, rather than superficial differences. Now it may be that appearance of the infinitive form is conditioned by some fact about the deep structure--for example the absence of tense in the auxiliary of the complement. But what any such putative difference might have to do with the identity requirement seems to be quite mysterious. We conclude that the identity requirement is not to be enforced with a deep structure constraint, but rather a transformational constraint. Perlmutter's arguments show that the transformation involved must be precyclical.

The second motivation for splitting up equi-NP-deletion is given by a reinterpretation of Lakoff's argument that the rule S-deletion is a "ubiquitous" rule; that is, can apply at any point in the derivation (Lakoff, "Deep and Surface Grammar," unpublished, 1966). The details of Lakoff's argument will not be given, and we will quote only the crucial examples.

Consider first Lakoff's example:

> Mary was believed by John to be pregnant, but Harry didn't believe it. (p. I-60)

The _it_ stands for

> Mary be pregnant

It follows from this example that the rule which deletes _Mary be pregnant_, leaving behind the _it_, must be precyclical, because this rule, S-deletion, applies to the whole sentence before the cyclical rules it-replacement and passive apply to the first conjunct.

Lakoff shows that S-deletion is preceded by equi-NP-deletion with the following example:

> John decided to run for office, but I will not stoop to it. (p. I-121)

The _it_ stands for

> I run for office

Since the antecedent of the deleted sentence is

> John run for office

the subjects of the antecedent and the sentence to be deleted must be deleted by equi-NP-deletion before S-deletion applies; otherwise the recoverability condition would be violated.

At this point Lakoff concludes that either there are two S-deletion rules, one precyclical and the other cyclical, or else equi-NP-deletion is precyclical. Another possibility, the solution we will adopt, is that there are two equi-NP-deletion rules. There are, then, the following conceivable orderings:

	I	II	III
precyclical:	S-deletion	(pre)-equi-NP-deletion S-deletion	equi-NP-deletion S-deletion
cyclical:	equi-NP-deletion S-deletion	equi-NP-deletion	

Lakoff argues against II and III; however we will show that his argument against II is fallacious, and that I does not adequately account for the facts, whereas II does.

First, it is agreed that III is impossible. Lakoff shows that the passive transformation is cyclical (p. I-52), and that equi-NP-deletion follows passivization. The example that shows the latter is:

Mary wants to be beaten by Otto. (p. I-124)

The argument against II is provided by the example:

I expected John to be examined by *me*, not by *Harry*. (p. I-123)

The underlined words have contrastive stress. If equi-NP-deletion were precyclical, then it would have to precede the passive transformation, since the latter is cyclical. But if this were so, the above sentence would be impossible, because equi-NP-deletion is an obligatory transformation. Thus we do not get.

*I expected me to examine John.

The first person subject of *examine* would be deleted before it could be affected by the passive transformation, so there would be no source for *me* in *by me*.

What this demonstration ignores, is the acceptability of

I expected _me_, not _Harry_, to examine John.

It appears that what is really going on is that equi-NP-deletion cannot delete a noun phrase containing a contrastively stressed element. Hence alternative II cannot be rejected on Lakoff's grounds. In fact, the unacceptability of

*I expected John to be examined by me.

where _me_ is not contrastively stressed, seems to be evidence for alternative II (but see below).

We now present some phenomena that are accounted for by alternative II, but not by I. Recall that in sentences with 'method' _by_-clauses, the subjects of the main sentence and the _by_-clause are agents. The _by_-clause subject is deleted by pre-subject-deletion, which, therefore only deletes agents. Pre-equi-NP-deletion also deletes only agents, while cyclical equi-NP-deletion deletes other noun phrases as well. A general explanation of this fact will be suggested in the next section. For the present, notice that in Lakoff's example,

John decided to run for office, but I wouldn't
stoop to it.

the subject of _run for office_, _John_ and _I_, are both agents. One cannot find acceptable sentences like this in which the verb of the deleted sentence is stative and so could not take an agent subject. Notice also, that

John expected to frighten the baby.

is ambiguous. John could be contemplating a deliberate action, or he could merely be anticipating a probable (unfortunate) state of affairs. However in the next example this ambiguity does not exist in either conjunct.

John expected to frighten the baby, but I wouldn't
stoop to it.

These facts can be accounted for under alternative II by restricting pre-equi-NP-deletion to the deletion of agents. They cannot be accounted for under alternative I, so far as I know; alternative I is therefore rejected.

To return to the previous example,

*I expected John to be examined by me.,

note that since pre-subject deletion does not delete agents, we would expect this to become acceptable if a stative verb is substituted for _expect_. This turns out not to be the case; evidently there is some additional restriction at work:

*I expect John to be seen by me.

*I expect John to have been examined by me.

Next we must show that the antecedents for equi-NP-deletion and pre-equi-NP-deletion are different. Consider the following example, which was provided by D. T. Langendoen:

John asked the guard to be admitted to the meeting room.

The deleted subject of the infinitival complement is understood to be _John_. The deletion of _John_ must be performed by equi-NP-deletion, since _John_ is not the subject of the complement when pre-equi-NP-deletion applies. Compare:

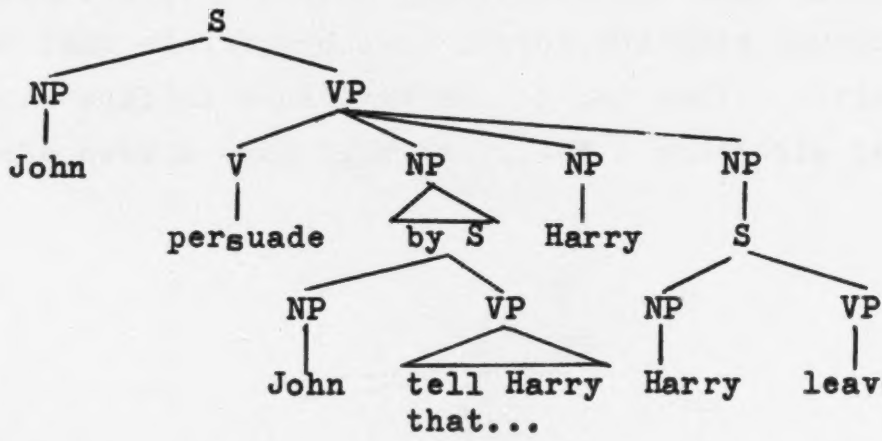
John asked the guard to admit him to the meeting room.

Here the understood subject is _the guard_; the antecedent, instead of being the subject, is the object of the main sentence. In this case _the guard_ is deleted by pre-equi-NP-deletion. So we have shown that cyclical equi-NP-deletion is like subject-deletion in taking the main sentence subject as its antecedent. We therefore combine equi-NP-deletion and subject-deletion into one rule, which we call equi-NP-deletion.

We now show that pre-subject-deletion and pre-equi-NP-deletion can be made to fall together. Consider:

John persuaded Bill to leave by telling him the barn was on fire.

Pre-equi-NP-deletion and pre-subject-deletion both apply in the derivation of this sentence, the antecedents being, respectively, the main sentence object and subject. If the two rules are to be combined, the determination of the proper antecedent must be made in some uniform way. This can be done, if the sentence is assigned the following deep structure:



With reference to this tree, the antecedent is the first noun phrase in the main sentence that precedes the noun phrase to be deleted. The justification for putting the by-clause immediately after the verb is as follows. Some types of sentences have related inchoatives (I use the term loosely). For example, corresponding to

John froze the water.

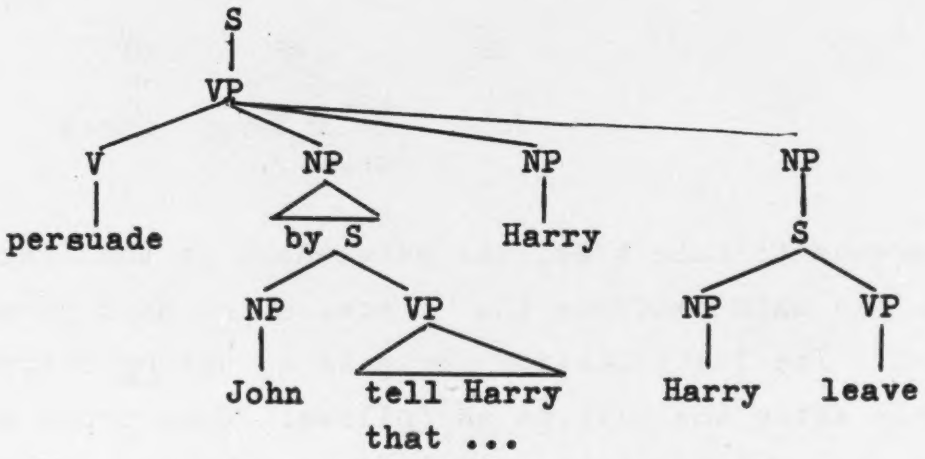
we have

The water froze.

The noun phrase immediately following the verb in the sentence with an agent, becomes the subject of the inchoative, if this agent is missing. If, in a sentence with an agent, the complements can be switched around, there are two possible inchoatives, and the noun phrase next to the verb is the one that becomes subject.

John hung cobwebs in the kitchen.
Cobwebs hung in the kitchen.
?The kitchen hung with cobwebs.

This kind of alternation, though, seems marginal in present English. See Lee (op. cit., p. 73) for a fuller discussion. Since apparently there is a rule which, in the absence of an agent, makes the first noun phrase into a subject, we can dispense with the adverb-to-subject rule that was posited earlier. That is, if the by-clause is first and there is no deep structure subject, we will have a deep structure,



By the inchoative rule just discussed, the by-clause will become the derived subject:

John's telling Harry that the barn was on fire
persuaded Harry to leave

Although the adverb-to-subject rule is eliminated, another rule is required to postpose the by-clause. This rule of postposition must precede extraction in order to retain our account of the cross-over violations. We see, then, that nothing is lost by putting the by-clause immediately after the verb in deep structure. Another rule is required, but one rule is also saved.

Since the problem of different antecedents can be resolved in this fashion, we will combine the rules pre-equi-NP-deletion and pre-subject-deletion. The new rule will be called pre-equi-NP-deletion.

To summarize, we list the rules that have been mentioned, in the order required by the discussion in this and the preceding sections.

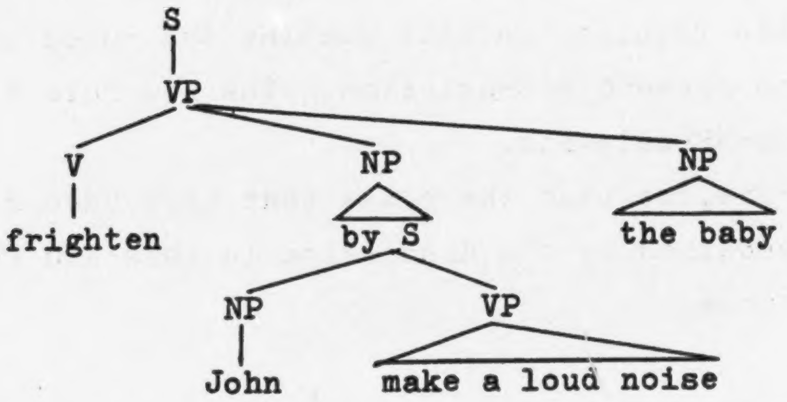
Precyclical:	pre-equi-NP-deletion S-deletion
Cyclical:	inchoative postposition of *by*-clause extraction subject-raising passive equi-NP-deletion

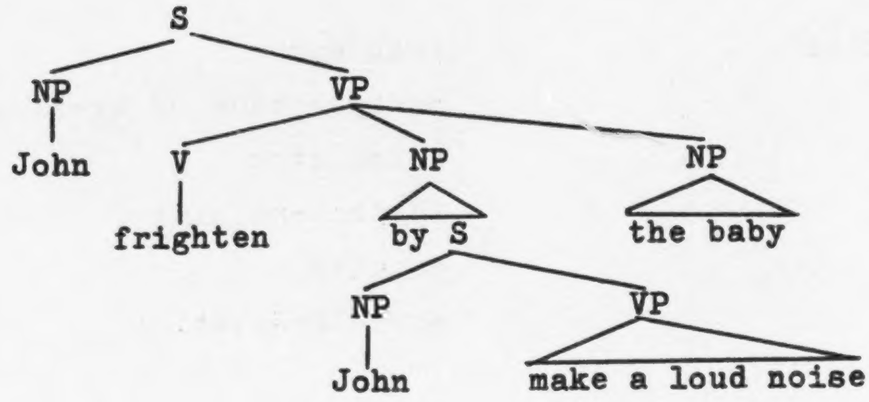
10. Ambiguous *by*-clauses.

We have concluded that the like-subject requirement is correctly accounted for in the case of sentences with 'method' *by*-clauses by the two noun phrases solution and in the case of sentences with 'subject' *by*-clauses by the no subject solution. Let us now consider the ambiguous cases--where *by*-clauses can be interpreted either as 'subject' or as 'method' *by*-clauses. The situation arises only when the understood subject of the *by*-clause is, or may be, an agent. E.g.:

John frightened the baby by making a loud noise.

The deep structures of this sentence, corresponding to the 'subject' and 'method' interpretations respectively, are:


S
VP
V
frighten
NP
by S
NP
John
VP
make a loud noise
NP
the baby


S
NP
John
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frighten
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by S
NP
John
VP
make a loud noise
NP
the baby

The claim is that the only difference between the deep structures is the absence of a deep structure subject in one, its presence in the other. We have already argued that the verbs in corresponding purposive and non-purposive sentences are to be identified (section 2). It has also been argued that 'subject' and 'method' *by*-clauses are both manner adverbs--they can be questioned with *how*, for example. Since, in addition, there is no reason to regard the main sentence objects as having different statuses in the 'subject' and 'method' senses, the hypothesis is at least tenable that the purposive ambiguity results from the optionality of the deep structure subject. In what follows, this hypothesis will be tested in the following way. We will note the circumstances under which sentences like the *frighten* sentence can be disambiguated. If the optional subject hypothesis is correct, the disambiguating contexts should be syntactically interpretable as requiring or disallowing a deep structure subject.

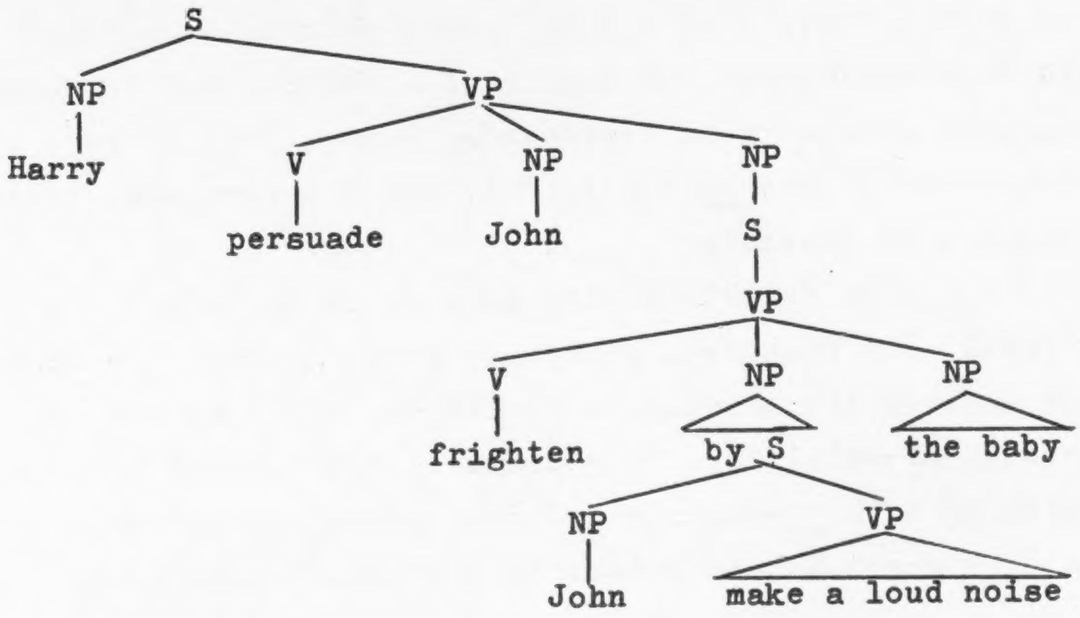
To begin, let us consider the tests for agents discussed in section 2. One of these is whether a sentence can occur as the infinitival complement of *persuade*. For example, the ambiguity of

> John frightened the baby by making a loud noise.

disappears in

> Harry persuaded John to frighten the baby by making a loud noise. (where *John* is the subject of *make*).

We found in section 9 that the subject of *frighten* is deleted by pre-equi-NP-deletion and that such a deletion must actually take place in sentences with *persuade* plus infinitive. Suppose that we started with the deep structure:



This could not give rise to a surface sentence with an infinitival complement, because there is no subject for pre-equi-NP-deletion to delete. The subject that is supplied by the extraction transformation gets there too late to be deleted by pre-equi-NP-deletion; pre-equi-NP-deletion, being precyclical, must apply before extraction, which is cyclical. Hence we have correctly predicted that the nonpurposive sense of the *frighten* sentence is impossible in the infinitival complement of *persuade*. If the complement is realized as a *that*-clause, the derivation does not block. In this case pre-equi-NP-deletion need not apply, and so

Harry persuaded John that he frightened the baby.

has the non-purposive sense. (And, as it happens, only this sense.)

The other agent tests will not be discussed. It is assumed that they also involve absolute exceptions to pre-equi-NP-deletion. We conclude that the agent tests are actually tests for deep structure subjects. This does not explain why sentences with stative verbs fail the agent tests; but it will henceforth be assumed, without evidence, that such sentences do not have deep structure subjects. With this assumption, we account for another way in which the purposive ambiguity is destroyed. When a stative verb is substituted in the *by*-clause only the non-purposive interpretation is possible:

John frightened the baby by being tall.

As previ ly remarked, sentences with 'method' *by*-clauses must undergo the pre-subject-deletion, which we now call pre-equi-NP-deletion. This claim is now changed to read, sentences with *by*-clauses and deep structure subjects are positive absolute exceptions to pre-equi-NP-deletion.[14]

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[14] This absolute exception requirement is awkward to state; we would expect such a requirement to be governed by some lexical item rather than a complex set of circumstances. It is worthwhile to mention again a possibility brought up in section 5; that the requirement that 'method' *by*-clauses

But in the above case pre-equi-NP-deletion cannot apply to delete the subject of the *by*-clause; we have assumed that there is no subject when pre-equi-NP-deletion applies. It follows that there can be no deep structure subject of *frighten* and no purposive interpretation.

Another way in which ambiguity can be destroyed is by replacing the main sentence verb with a verb that requires an agent, such as *assassinate*. Assuming that such verbs require deep structure subjects, we account at once for this lack of ambiguity and the fact that sentences with such verbs always pass the agent tests.

Finally, making the main sentence object coreferential with the subject disambiguates the sentence in favor of the purposive interpretation. This follows from the optional subject hypothesis, because if the subject is already there it needn't cross over the object; no cross-over violations are predicted. It is not clear that there *is* any disambiguation with *frighten:*

John frightened himself by making a loud noise.

But at least things work out with the examples in section 7.

There are methods of disambiguation for which we have no account. Preposing the *by*-clause, or substituting for

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undergo pre-equi-NP-deletion is stated as a surface condition on *by*-clauses. Namely, *by*-clauses must have their subjects removed. But in light of the discussion in section 8 of the *by*-phrases that retain their subjects, but nevertheless behave in other ways just like *by*-clauses, another possibility suggests itself. Perhaps there are certain formal characteristics of *by*-clauses whose appearance is conditioned by the removal of their subjects. A formal difference between *by*-clauses and the similarly-acting *by*-phrases is that the latter have *of* before their objects. (Cf. Lees, op. cit. This is one difference between gerundive and action nominals.) Then we might say that *of* can be deleted only if the subject is first removed. This would be parallel to the Kiparsky's observation (op. cit.) that the *to* of the infinitive appears only when the subject is removed.

the subject a noun phrase that refers to something that doesn't move on its own, removes the purposive interpretation.

By making a loud noise John frightened the baby.
The sky frightened the baby.

Let us now consider the ambiguity of sentences with verbs like *frighten*, verbs that can take either a 'subject' or a 'method' *by*-clause, but which have no *by*-clause. For example,

John frightened the baby.

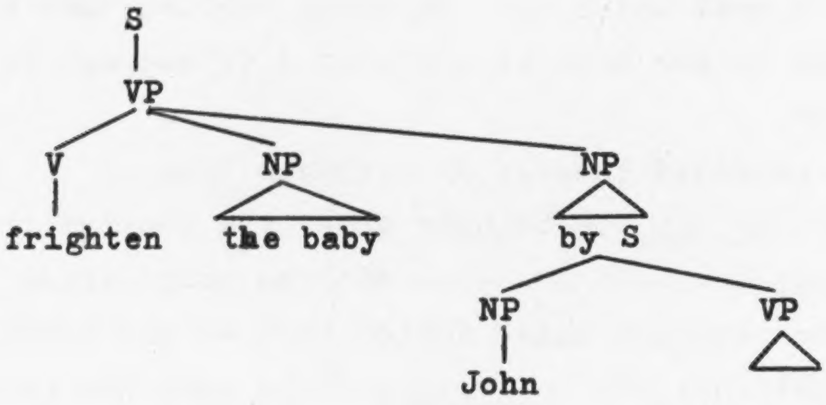
The purposive interpretation of this is no problem. We can say that *John* is the deep structure subject. But if there is no deep structure subject in the non-purposive sense, where does the surface subject *John* come from? That *John* does have to be moved or copied across the object in the non-purposive interpretation is shown by the lack of ambiguity when subject and object are coreferential:

John satisfied himself that he was drugged.
John persuaded himself not to drive home.

In these sentences a non-purposive interpretation is impossible, as is predicted by the cross-over principle if the surface subject has to be moved or copied into subject position. The copying can be effected by the extraction transformation if we are allowed to postulate an "invisible" *by*-clause. Suppose that the *by*-clause's verb phrase is an unspecified dummy, △, and that *by* △ - is eventually deleted. The derivation of the non-purposive sense of

John frightened the baby.

will then be as follows:


S
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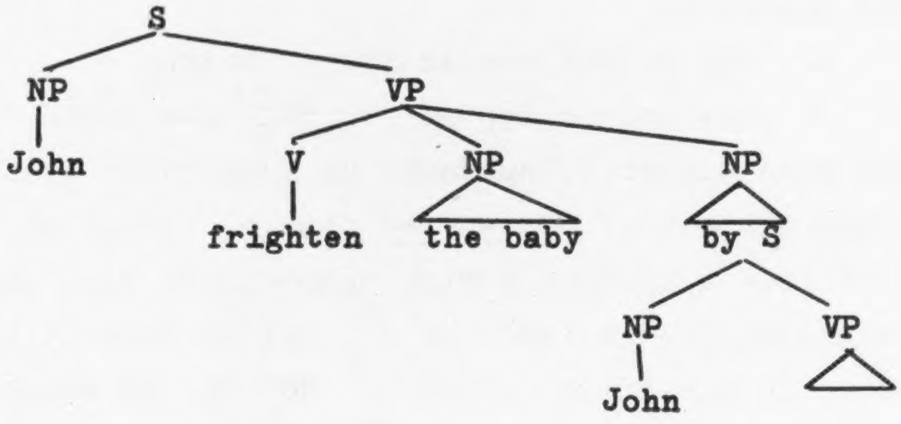
NP
NP
frighten
the baby
by S
NP
VP
John

extraction:


S
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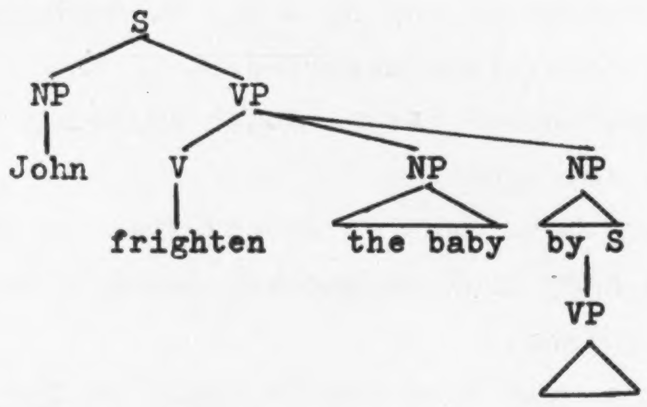
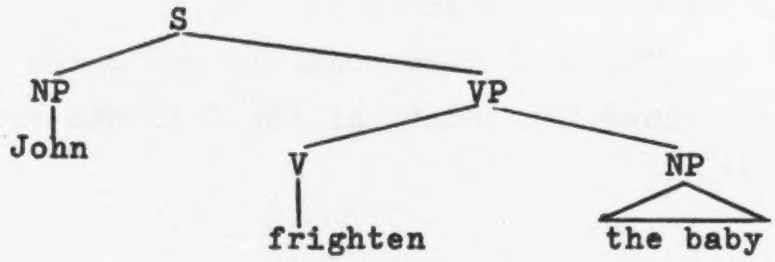
VP
John

Subject-deletion:


S
NP
VP
John
V
NP
NP
frighten
the baby
by S
VP

deletion of by △:


S
NP
VP
John
V
NP
frighten
the baby

As for justifying this account, we first observe that it probably doesn't cost anything. We found earlier that an unspecified verb phrase must be postulated to account for the acceptability of

John revealed himself by having a limp.

Presumably also, by Δ is deleted after the passive transformation has applied to a sentence with an unspecified subject. On the positive side, notice that we are maintaining that if a sentence with a frighten-type verb has no agent and no by-clause, it is incomplete, and this seems intuitively correct. Consider that the following two sentences form a connected discourse.

A. The poison caused Mary's death;

B. The poison was in the pill she took.

Cause may take either a 'subject' or a 'method' by-clause. The surface subject of cause, the poison, is not an agent, so it must be from a by-clause with unspecified verb phrase. The second sentence, B, is taken as filling in what is left unspecified in the first sentence. Now having asserted A and B, it would be very odd to add in the same breath:

C. The pill Mary took did not cause her death.

This is because, instead of saying A and B, with equal force the following could have been asserted:

The poison caused Mary's death by being in the
pill she took.

Which, in turn, means the same or nearly the same as

The pill Mary took caused her death by containing
the poison.

(We predict this synonymy from the snyonymy of The poison was in the pill, and The pill contained the poison.)

Since this is a contradiction of

C. The pill Mary took did not cause her death.

we have explained the oddity of the C in the context given by the sentences A and B. It is difficult to see how this oddity could be explained if inanimate subjects of cause were taken to be deep structure subjects.

Another argument for regarding an inanimate (or purposeless) subject of cause, frighten, etc., as coming from a zeroed by-clause proceeds from the difference in acceptability between

A. John deliberately frightened the baby in a rapid manner.

and

B. *The sky frightened the baby in a rapid manner.

In a rapid manner is a manner adverb that does not, ordinarily, require an agent. Compare:

The sky darkened in a rapid manner.

But with frighten type verbs, evidently in a rapid manner does require an agent. We can account for this by postulating that there can be only one manner adverb per (deep structure) clause. A by-clause is a manner adverb, so the zeroed by-clause in

The sky frightened the baby.

occupies the manner adverb slot for this clause. Another manner adverb cannot be added. Hence the unnacceptability of B above, confirms the existence of the zeroed by-clause. In the A sentence there is no reason to postulate a zeroed by-clause, since John is the deep structure subject. The manner adverb in A fills the position that could also have been filled with a 'method' by-clause. Note that deliberately in the A sentence is not a manner adverb. One cannot answer the question

How did John frighten the baby in a rapid manner?

by saying

*Deliberately.

(For why one can ask the question, see below.)

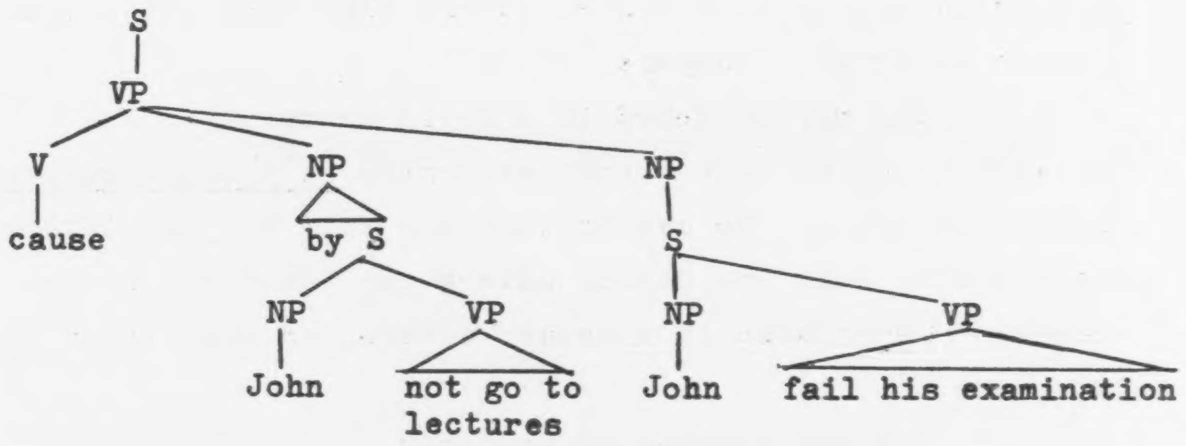
In addition to the ambiguity between 'subject' and 'method' by-clauses, there are also ambiguities between 'cause' and 'method' *by*-clauses. For instance:

John failed his examination by not going to lectures.

This ambiguity disappears, when the sentence is submitted to an agent test. There is no 'cause' sense in

Harry persuaded John to fail his examination by not going to lectures. (where *John* is subject of *go*)

So we must find some subjectless deep structure for the 'cause' sense. We propose, tentatively, the following:



To get the right surface structure, *cause* must be deleted, and the *by*-clause somehow lowered into the verb phrase *fail his examination*. The motivations for this deep structure are: first, by the inchoative rule it gives the paraphrase of the 'cause' sense

Not going to lectures caused John to fail his examination.

And secondly, we preserve the generalization that manner adverbs occur only in a sentence whose main verb is non-stative. Without the superordinate *cause* sentence, such sentences as

John heard the angels by falling into the pickling vat.

would violate this generalization. Also it seems that the verbs that can occur in the object complement of *cause* are the same verbs that take 'cause' *by*-clauses, namely verbs that can express events. *Know* is not such a verb, and the following two sentences seem equally odd.

?John knew Sanskrit by studying a lot.

?Studying a lot caused/enabled John to know Sanskrit.

Finally, supposing 'cause' *by*-clauses to come from higher sentences with *cause* accounts for some exceptions to the above generalization that there can be only one manner adverb per clause. Recall that 'enabling' *by*-clauses are derived from 'cause' *by*-clauses by deletion of *succeed in*. 'Enabling' *by*-clauses are then also from high sentences. Now consider

John assassinated the Premier quickly by using a gun.

John frightened the baby quickly by being tall.

The *by*-clauses here cannot be interpreted as 'method' and 'subject', respectively. (They could be so interpreted if it weren't for the *quickly*'s.) Rather, in the first sentence, the *by*-clause is 'enabling':

Using a gun enabled John to assassinate the Premier quickly.

In the second sentence the *by*-clause is either 'cause' or 'enabling':

Being tall caused/enabled John to frighten the baby quickly.

The fact that the *by*-clauses are not 'method' or 'subject' confirms the one-manner-adverb-per-sentence generalization. These cases where *quickly* cooccurs with a 'cause' or an 'enabling' *by*-clause are not exceptions to the generalization, because *quickly* and the *by*-clause arise in different deep structure clauses. In the question

How did John frighten the baby in a rapid manner?

the *how* questions a 'cause' or 'enabling' *by*-clause.

We should mention that the quickly in

?John's being tall frightened the baby quickly.

is not a manner adverb. This can be seen both from the fact that it cannot be replaced by *in a rapid manner*:

*John's being tall frightened the baby in a rapid manner.

and from the fact that the question

How did John's being tall frighten the baby?

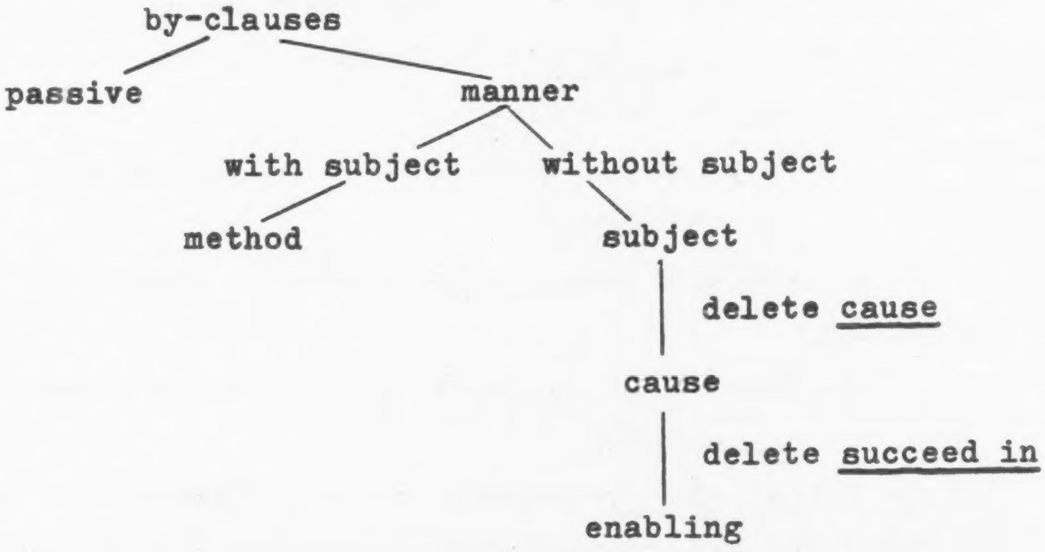
cannot be answered:

*Quickly.

Rather what we have here is a postposed sentence adverb, from:

John's being tall quickly frightened the baby.

The higher sentence analysis for 'cause' and 'enabling' *by*-clauses enables us to revise the chart given in section 3. Our new taxonomy of *by*-clauses is:


by-clauses
passive
manner
with subject
without subject
method
subject
delete cause
cause
delete succeed in
enabling

In conclusion, we hope to have shown that sentences express purpose if and only if they have deep structure subjects. Sentences that express purpose have agents, and agents are deep structure subjects. When a sentence does not have an agent, the noun phrase that appears as surface subject may have various semantic relationships to the main verb and other elements of the main sentence. This is just what one would expect if such noun phrases are transformationally introduced into subject position, because transformations are notorious for obscuring underlying semantic relationships.

It is clear, however, that the presence of a deep structure subject is not sufficient to characterize the differences--in particular, the semantic differences--between purposive and non-purposive sentences. But assuming that the remaining problems can be defined and solved, we make the programmatic suggestion that other case relationships such as 'patient' and 'goal' need not be taken as primitives. That is, we hope that the primitive categories of syntax can be held to a very small number, including things like 'sentence', 'noun phrase', 'verb', but not things like 'agent', 'patient', etc.

Modal Auxiliaries in Infinitive Clauses in English*

D. Terence Langendoen

*Sponsored in part by the National Science Foundation through Grant GN 534.1 from the Office of Science Information Service to the Computer and Information Science Research Center, The Ohio State University.

Modal Auxiliaries in Infinitive Clauses in English[1]

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[1] This is a revision of my earlier paper, Langendoen (1968).

It is a well-known fact of English grammar that a modal auxiliary cannot occur in an infinitive clause:

(1) *John hopes to M find enjoyment in his new job.

(2) *John seems to M find enjoyment in his new job.

where M is any of the modal auxiliaries *can*, *could*, *may*, *might*, *must*, *ought to*, *shall*, *should*, *will*, *would*. If we follow traditional grammar and Ross (1967a) in assuming that the modals are themselves verbs which occur with infinitive clause complements, then the fact that two modals cannot occur together is a consequence of the fact that modals are excluded from infinitive clauses:

(3) *John M M go.

The problem concerning us here is the description of the mechanisms in English grammar which are necessary to exclude modals from infinitive clauses.

One of these mechanisms is the transformational rule (or rules) which form infinitive clauses out of the finite clauses which underlie them; such a rule (or rules) could be formulated so as to delete any modal verbs occurring in those clauses. Thus in Lees (1960, p. 108), we find the suggestion that sentences like:

(4) He knows where to go.

should be obtained from more basic structures like:

(5) He knows where he should go.

by a transformational rule. Later, Rosenbaum (1967, p. 31) speculated about the possibility of obtaining:

(6) I expect John to go.

from the structure which also underlies:

(7) I expect that John will go.

Rosenbaum, however, did not commit himself to this analysis because he noticed that not all infinitive clause complements can be interpreted as finite clauses containing modals. Thus, while (6) and (7) are stylistic variants,[2] we observe that the following sentence has no stylistic variant in which a modal appears in a finite clause corresponding to its infinitive clause:

(8) John seems to find enjoyment in his new job.

Instead, we find that any such stylistic variant contains no modal at all:

(9) It seems that John finds enjoyment in his new job.

The conclusion that I think it is proper to draw is that the transformational rule which forms infinitive clauses out of finite clause complements deletes those modal auxiliaries in finite clauses whose presence is governed by the higher predicate. Thus, the presence of will or would in the object complement of expect is governed by that verb, and the rule which converts that complement into an infinitive clause deletes that auxiliary. On the other hand, seem does not govern the occurrence of any particular modal in its subject complement, and so no particular one can be deleted when that complement is infinitivized.[3]

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[2] The term "stylistic variants" means just what the name implies: sentences which do not differ in meaning but only in surface syntactic form.

[3] In other words, the deletion of the modal is strictly "recoverable."

But then, how are we to account for the exclusion of modals from those infinitive clauses in which modal deletion is not part of the rule of infinitivization? It cannot be handled as a deep structure constraint since modals can freely occur in the more basic finite clause:

(10) It seems that John might find enjoyment in his new job.

(11) It seems that John can't find enjoyment in his new job.

etc. One possibility that suggests itself is that the rule of infinitive formation is to be considered inapplicable to the structures underlying (10)-(11); in other words if the rule is not permitted to delete the modal that occurs in a finite clause, then the presence of one blocks the applicability of the rule. This "brute force" solution would work, provided there were no cases of predicates which require infinitivization of their complements, but which do not govern the occurrence of particular modals in those complements. It is, of course, impossible by mere inspection to tell whether any such predicate exists, since if infinitivization is obligatory, one cannot test for the possibility of different modals in finite clause complements (all such sentences would automatically be ungrammatical). However, if one reflects carefully on the meaning of such sentences as:

(12) John tends to antagonize his teachers.

(13) John will destroy your sand-castle.

one concludes that no particular modal has been deleted in the complements of the predicates tend and will. But there is no reason on semantic grounds to exclude modals from those complements. To see this, one need only insert non-modal synonyms for particular modals in (12) and (13), and observe that the results are both sensible and grammatical:

(14) John tends to be able to antagonize his teachers.

(15) John will be permitted to destroy your sandcastle.

If these observations are correct, then we are faced with the following dilemma. A sentence such as:

(16) *John tends that he can antagonize his teacher.

looks as if it should be ruled out because infinitivization is obligatory with complements of the verb tend, but the sentence:

(17) *John tends to can antagonize his teachers.

looks as if it should be excluded because infinitivization is inapplicable when the finite clause contains a non-deletable modal.

One way to resolve this dilemma is to permit infinitivization to apply to the structure underlying (16), thus generating (17), and to hold that (17) is rejected as ungrammatical because it violates an output condition on English sentences to the effect that a modal cannot occur in an infinitive clause.[4] It turns out, fortunately, that there is some independent evidence to support this conclusion.

Consider once again example (11), which is repeated here for convenience:

(11) It seems that John can't find enjoyment in his new job.

This sentence, it turns out, does have a stylistic variant to which infinitivization has applied, namely:

(18) John can't seem to find enjoyment in his new job.

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[4] On the notion "output condition", or "surface structure constraint", as it is sometimes called, see Ross (1967b), Perlmutter (1968), Lakoff (1968).

by *can* or *could*, but notice that it is this sense which is conveyed in (21). Therefore we must conclude that the *can/could* of *can/could tell* can be raised even if it is not negated. Also notice that if the negative is incorporated into the subject, *can/could* raising is permitted:

(22) No one could seem to figure out what to do next.

but not if it is otherwise incorporated:

(23) John couldn't seem to find anything.

(24) *John could seem to find nothing.

Although the problem of stating the exact form of the *can/could* raising transformation is considerable, its existence provides additional support for the view that English has an output condition which excludes sentences containing a modal in an infinitive clause. The reason is that in order for the rule to apply, the infinitivization transformation must be allowed to apply first, creating an infinitive containing a modal. If that modal happens to be *can* or *could*, and there is also a negative present (or if other conditions hold--see foregoing discussion), then the rule applies and a grammatical sentence ultimately ensues. If another modal is present, or if *can* or *could* are not accompanied by a negative, then the resulting sentence is ruled ungrammatical by the proposed output condition.

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In general, when the subject complement of the verb _seem_ (and no other!) is a finite clause containing a negative and the modal _can_ or _could_, then both the negative and the modal can be raised to the main clause.[5] I propose that this raising be handled by a transformation which applies after infinitivization has been applied, rather than by the infinitivization rule itself, although my reason for suggesting this is not particularly strong, namely that _can/could_ raising seems to be acting as a "rider" on a negative raising transformation which also can apply independently of the modal. Thus we obtain the following as stylistic variants:[6]

(19) John seems not to be discouraged.

(20) John doesn't seem to be discouraged.

There is, however, some difficulty in viewing _can/could_ raising as necessarily involving the raising of the negative. Consider the sentence:

(21) John can seem to tell if people are lying to him.

The verb _tell_ is only used in the sense "predict" when preceded

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[5] See also Quirk (1965, p. 217), where the syntactic oddity of an example like (18) is pointed out, but not elaborated upon.

[6] Negatives, however, can be raised out of finite subject complements; compare:

(i) It seems that John doesn't find enjoyment in his new job.

(ii) It doesn't seem that John finds enjoyment in his new job.

but not _can/could_:

(iii) *It can't seem that John finds enjoyment in his new job.

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Some Problems in the Description of English Accentuation*

D. Terence Langendoen

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Some Problems in the Description of English Accentuation

0. This paper is a direct result of recent correspondence between J. R. Ross and myself regarding some possible reanalyses of the rules for English accentuation as given by N. Chomsky and M. Halle in *The Sound Patterns of English* (henceforth SPE). Sections 1 and 2 of this paper deal briefly with some of Ross' proposed revisions of the main stress rule (MSR) and alternating stress rule (ASR) of SPE, and with the relationship of the ASR to a rule with similar effects which operates in compounds--the rhythm rule (RR).

In Section 3, I propose a rule which stresses certain syllables which precede a primary stressed syllable, and a complementary rule which destresses those same syllables. In Section 4, the anticipatory stress rule is generalized. Section 5, which is the heart of this paper, deals with the various destressing rules which have been proposed so far, one due to J. Fidelholtz, two that were pointed out to me by Ross, and the destressing rule of Section 3. It is shown that there are two very general destressing rules (which can perhaps be combined into one rule) which do the work of the previously discussed four rules. Finally, in Section 6, a very simple statement of the MSR for English is stated and partially justified.

1. According to SPE, the last syllable of a noun regularly receives primary stress only if it contains an underlying tense vowel. Thus we have: *machíne*, *paráde*, *valét*, *careér*, *canoé*; but *Égypt*, *désert*, *róbot*, *cíty*. The accentuation of nouns such as *eclípse*, *marionétte*, *cemént*, *dessért* is handled by postulating an underlying final -*e*, which is deleted. If necessary, as in the case of *marionétte*, the stressed vowel is assumed to be followed

by a geminate cluster, which is later simplified. The tertiary stress on the ultima in deverbal nouns like *tórmènt* is accounted for by positing that this word is analyzed $[[\text{torment}]_V]_N$, that it receives final stress on the first cycle by the MSR for verbs, and that this stress is reassigned to the first syllable by the MSR applying on the second cycle (case "c" of the MSR, SPE p. 99,) which considers a stressed final syllable in nouns and adjectives as part of the environment of the MSR.

Ross suggests a reanalysis of these facts which allows nouns to receive final stress by the MSR in a larger number of cases than is allowed in the SPE account. According to his analysis, all the nouns cited in the previous paragraph receive final stress by the MSR--there is no need for any vanishing final *e* to handle the facts of stress assignment, nor for a transformational cycle for words. The ASR applies after the MSR to shift the stress in nouns like *tórmènt*.[1]

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[1] The exact formulation of the ASR is difficult to arrive at. Basically, it locates the primary stress one, two, or possibly three syllables away from a stressed ultima, or (in Ross' account) stressed penult if the final syllable ends in *i*, *V̌r*, *V̌l*, and possibly *u*. This version eliminates entirely the need for case "c" of the MSR as formulated in SPE.

By and large, words must be lexically marked for the ASR, although there is some regularity which can be exploited (this matter is given some attention also in Section 5). Disyllabics whose ultima contains a tense vowel or diphthong generally do not undergo it, for example *sàrdíne* (the tertiary stress on the initial syllable of this word is discussed in Section 3), *Kùwaít*, *Dètroít*, *Chìnése*, *boùdoír*, *Loùíse*; but *cómbìne*, *écrù*, *détoùr*, *sírlòin*. Conversely those disyllabic words which do not contain a final tense vowel or diphthong generally do, thus *tórmènt*, *cónvèrt*, *mústàng*, *ássèt*, *mónàrch*; but *Còrvétte*, *Cèylón*, *èclípse* (although *éclìpse* does occur dialectally). Trisyllabic nouns marked as undergoing ASR include *Óregòn* (the alternate form *Órego̊n* (the symbol ° designates weak stress and vowel reduction) is obtained by an additional rule which destresses certain tertiary final syllables; similarly *ádjecti̊ve*, which is underlyingly /æd=ǰekt+īv/ --compare *adjectival*), *álphabèt*, *ámpersànd*, *Bólshevìk*, *Hórowìtz*; those marked as not undergoing it include *màcaroón* (here the initial tertiary stress is supplied by a rule which, in long words, places secondary (later reduced to tertiary) stresses on those syllables which would get primary stress if the word were to end on the syllable preceding the one which actually gets primary stress; compare such forms as *Àdiróndàck*, *elèctrostátic*, *Monòngahéla*[2]), *sùffragétte*, *kàngaroó*, *Tìmbǔktú* (the symbol ˇ designates a quaternary stress which protects the quality of the vowel so stressed from reduction; just how that stress is assigned is discussed in Section 4.), *Ìstǎnbúl*, *lìngerié*, *àvǎnt-gárde*, *bòurgeǒisié*, *Tèl Avív*, *Sàn Jóse*, *lìǎisón*, *chìmpǎnzée* (the variants *lìǎisòn*, *chìmpánzèe* are obtained by applying the ASR to move the primary stress to the penult).

2. In addition to the ASR, there is another rule which has the effect of moving the main stress in a word to an earlier syllable; this rule however works only in compounds, and has roughly the effect:

$$\grave{}\ldots\hat{}\ldots\acute{} \rightarrow \hat{}\ldots\grave{}\ldots\acute{}$$

where the dots symbolize possible more weakly stressed syllables. The primary stress is in the second word of the compound, the tertiary and secondary ones are in the first. We may call this the rhythm rule (RR)--a similar rule for German has been discussed by

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[2] This rule can be subsumed under the ASR in a relatively straightforward way which I do not pursue here.

P. Kiparsky in "Über den deutschen Akzent." Its effect can be seen in such expressions as *Chînèse lánguage* (cf. *Chìnése*), *sârdìne sándwich* (cf. *sàrdíne*), *Nêw Yòrk Gíants* (cf. *Nèw Yórk*), *Tîmbuktù indústrialist* (cf. *Tìmbǔktú*), *mâcaroòn íce cream* (cf. *màcaroón*), *Tênnesseè Érnie* (cf. *Tènnesseé*), etc. In some cases, the rule is optional; for me either *Dêtroìt Líons* or *Dètroît Líons* is acceptable (as is *De̊troît Líons*, for which see Section 3). Similarly, either *Côrvètte státion wagon* or *Còrvêtte státion wagon* (cf. *Còrvétte*); either *Tŷròne Pówer* or *Tỳrône Pówer* (cf. *Tỳróne*); either *Mârléne Deétz* or *Màrlêne Deétz* (cf. *Màrléne*).

In still other cases, the rule is inapplicable; thus I accept only *Loùîse Túcker*, and not **Lòûise Túcker* (cf. *Loùíse*); only *Èlaîne Mórison*, and not **Êlàine Mórison* (cf. *Èlaíne*). That the ASR and RR are intimately related can be seen from the following implications: if a word is subject to ASR it necessarily undergoes RR (more precisely, the application of the ASR prior to the phrase cycle has obviated the need for RR on the cycle for phrases); conversely, if a word cannot undergo RR, it cannot undergo ASR either (cf. *Louise* and *Elaine*). Words which are not subject to ASR may or may not undergo RR, and in some cases RR is optional.

In the above discussion only disyllabic nouns were considered. In nouns of three or more syllables in which the MSR assigns primary stress to the ultima, RR always appears to be at least optionally applicable, even to those to which ASR cannot apply. Thus I obtain, besides the examples already given, *Jâpanèse físherman* (cf. *Jàpanése*); both *Kâlamazoò zóo* and *Kàlamazoô zóo*; (cf. *Kàlamazoó*); both *chîmpǎnzeè cólony* and *chìmpǎnzeê cólony* (cf. *chìmpǎnzeé*); both *lîngerìe sálesman* and *lìngerîe sálesman*.

Despite the obvious relatedness of ASR and RR, they are not to be considered the same rule, for if they were to be so considered (the version known as ASR applying to words and that known as RR to compounds), it would not be possible to provide coherent lexical representations for the classes of nouns including *alphabet* (ASR obligatory, RR vacuous), *sardine* (ASR inapplicable, RR obligatory), *Tyrone* (ASR inapplicable, RR optional), and *Louise* (ASR and RR both inapplicable) respectively. Moreover, RR is applicable to many nouns to which the application of ASR is excluded (i.e. ASR is not simply inapplicable because of a lexical mark to that effect), for example *Còlorádo*. ASR cannot apply to this word for the simple reason that the primary stress is on the penult rather than the ultima; however RR is applicable to this word, as in *Côloràdo Démocrat*. Many similar examples could be given.

3. We turn now to the problem of accounting for the tertiary stress on the initial syllable of words like *sàrdíne*. As Ross observes, an initial syllable of a word may receive a tertiary stress if it is a strong syllable (in the sense of SPE) and if the second syllable of the word has primary stress. Thus besides *sàrdíne*, we have *bàndánna*, *Àrléne*, *Àfghánistan*, *sèctárian*, *sùccéss*, *èléctric*, *òʼclóck*, *fàtálity*, *tònálity*, *hùmídity*, *leùkémia*, *còóperate*, *psỳchólogy*, *foùndátion*, *aùtónomy*, *nàíve*, *chàótic*, *àtýpical*, *Bòstónian*, etc.; but *båńána*, *ålóne*, *sůscéptible*, *ånémia*, *cåpácity*, etc.[3]

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[3] There are a number of apparent counterexamples; words with a stressed, apparently weak initial syllable preceding a stressed syllable, but in these the initial vowel is *æ* followed by a labial consonant: *tàbú*, *snàfú*, *càfé*, *tràpéze*, *Hàmític* (cf. *Se̊mític*). This suggests that such vowels should be regarded as tense for purposes of stress assignment, for which one has additional support in words like *Àlabáma*, *Bìáfra*, etc.

If we consider, however, such words as *ràgoút* [ræ̀gú], *tàtóo* [tæ̀tú], *tàbleaú* [tæ̀bló:], we observe that *æ* may be regarded as tense provided there is a rounded vowel in the following syllable and that no palatal intervenes. When followed by *n*, *æ* may also be the representative of tense *a* (not SPE *A*, but the stressed vowel of *fáther*), as in *banána*, *Montána* (cf. *Neváda*). In *Hànoí* [hæ̀nɔ́y] the *æ* may be considered tense either because it is followed by *n*, or because the vowel of the following syllable is rounded.

Monosyllabic prefixes also tend to receive a tertiary stress, even if the first syllable of the word is weak: *ùnúsual*, *dìsárm*, *ìnért*, etc.

There are speakers of American English for whom these are the only possible pronunciations of these words, but there are other speakers who, in fast speech, tolerate weak stress and consequent vowel reduction in the initial syllable of many words of the first group. For such a weakening to take place, the word must be a relatively familiar one, and if of known foreign origin, reasonably Anglicized. The weakening is most common in words whose first syllable contains a lax vowel followed by a consonant cluster which is not introduced by an occlusive or which is not unusual in some way. It is also common in words in which the initial syllable contains one of the tense vowels _A_, _E_, or _O_ (in the sense of SPE) followed by a single consonant. Examples include: *Cåmbódia*, *e̊nthúsiasm*, *co̊mpóse*, *cåntánkerous*, *Mo̊ngólian*, *ůltérior*, *Sẙlvéster*, *o̊rthógraphy* (initial [ɔ], however, reduces only if followed by [r]; the pronunciations *Bo̊stónian*, *aůtónomy* would be very unusual), *pårtáke*, *Vi̊rgínia*, *mẙstérious*, *åscórbic*, *I̊sráeli*, *åthlétic* (the fact that *àthlétic* is also possible suggests that we are here dealing with an initial strong syllable), *di̊phthéria*; *e̊léctric*, *De̊tróit*, *fåtálity*, *to̊nálity*. Initial [u] before a single consonant in an initial syllable generally may weaken if it is preceded by a [y], as in *hůmídity*, *fůtílity*, but much less likely otherwise: *coůváde*, *stůpídity*, *brůtálity*, *leůkémia* would be very unusual.[4]

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[4] I pronounce _Teutonic_ with a [y] on-glide to the [u]; nevertheless I fail to weaken the initial syllable as if that [y] were not there (which it "shouldn't", given the fact that the [u] follows an initial dental and is pretonic).

An initial vowel immediately preceding the tonic vowel may be reduced, provided it is permitted to turn into a glide, as in *co̊óperate* [kwápərèt], *me̊ánder* [myǽndər]. Less likely examples are *Sůéz*, *re̊álity*, *o̊ásis*, while **chåótic*, **nåíve*, **åórta* would be impossible.

Words which would be expected to show a reduction of the sort described here, but which do not, can usually be explained on morphological grounds, or on the grounds that the word has not been completely Anglicized. Thus, words with the privative prefix a- never show this reduction, despite their phonological status, for example àtýpical, àmóral; never *åtýpical, *åmóral. Non-completely assimilated foreign words include dèténte, Dèscártes, règíme, Beirút, Pàscál, Sàn Juán, Tàngíers, Mànchúria.[5] Morphology has been forgotten, apparently, in o̊'clóck, but not in Irish names like Ò'Ríley (although I suspect pronunciations like O̊'Ríley are not uncommon).

Weakening is possible, but less usual, in case the initial vowel is followed by an unusual consonant cluster, as in ånhýdrous, Ålhámbra, Åfghánistan, spåsmódic, åsbéstos, etc.; or a cluster introduced by án occlusive, as in åbdóminal, si̊gníficant, e̊cstátic, lůxúrious, Fi̊tzgérald, etc.[6] I have no independent operational test for unusualness of consonant clusters, however, and must regretfully leave this matter in its present unsatisfactory state.

Finally, weakening is impossible, or nearly so, in case the initial syllable contains a diphthong, either [ay], [aw], or [ɔy], or [a] in incompletely assimilated French loans. Thus we have poìnséttia, never *poi̊nséttia; foùndátion, never *foůndátion, ìcónic, never *i̊cónic; Coìntreaú, never *Coi̊ntreaú. There are, however, a number of examples with initial syllable [ay] which may be reduced in very fast speech by some speakers, notably *i̊déntity*, *i̊rónic*, *di̊géstion*, which possibly can be explained on the basis of the *I* ∼ *i* alternation, as formulated in SPE.

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[5] Examples like these are doubtless in more or less of a state of flux for many speakers. An interesting example is Lòs Ángeles ~ Lo̊s Ángeles. We should not expect weakening if the initial vowel were [˚].

[6] Proper names in Mc or Mac, however, generally show such weakening, for example Måc Donald, MåcPhérson, etc.

Similarly, many speakers tolerate weakening of the first syllable of *psychiatrist*, roughly [səkáyətrìst]; but the same speakers will not so readily agree to the weakening of the first syllable of *psychologist*. This is apparently due to the application in the first example of an optional rule which dissimilates *I* to *i* in a syllable preceding a stressed *I*:

$$I \rightarrow i \;/\; \text{--}C_{0}\,\acute{I}$$

It is hard to find other examples in which this rule has applied; *bye̊-byé* [bəbáy] and *flỳ-bẙ-níght* [flàybənáyt] are possible candidates.[7]

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[7] The rule under discussion is not to be confused with another rule in English which obligatorily dissimilates *I* to *i* when it follows a stressed *I* and is itself followed by another syllable. Examples which illustrate the application of this rule are *bicycle*, *tricycle*; compare *motorcycle*, *unicycle*. The proviso regarding a following syllable is needed to prevent the rule from applying to words like *finite*, *pyrite*, *Sinai*, and *Illini*.

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4. On the basis of the discussion in Section 3, we see that a rule is needed which assigns a low-degree of stress to the nucleus of a word-initial strong syllable preceding the main stress. Let us call this rule the primary stress anticipation rule (PSAR). Later, for fast speech, certain of the stress assigned by PSAR may be eliminated. We ask now, first, is there reason to generalize PSAR to be applicable to syllables other than word-initial ones? And second, is the rule applicable to

syllables which precede stresses other than primary ones? The answer to both questions is apparently affirmative, for which reason we hereby change the name of the rule to the stress anticipation rule (SAR).[8]

To see that SAR is applicable to non-initial syllables, consider the problem of how the quaternary stresses are to be assigned in such words as: *chìmpǎnzeé*, *Tìmbǔktú*, *Ìstǎnbúl*, *lìaǐsón*, *àvǎnt-gárde*, *bòurgeoǐsié*, *Pènnsy̌lvánia*. To my knowledge, there is no mechanism in SPE whereby these stresses can be assigned, but it is obvious that the proposed SAR automatically accounts for them. Moreover, as Ross has pointed out to me, the rule also can be used to account for the quaternary stress in words like *rèlǎxátion*, *cònděnsátion* without appealing to a word-cycle, as in SPE.[9]

Notice also, that weakening is common in precisely those examples in which we would expect it from the discussion of Section 3, namely *lìai̊són*, *Pènnsẙlvánia*, and *còndе̊nsátion* (see also footnote 9).

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[8] This acronym, unfortunately, is the same as the one in SPE for a rule which weakens all secondary stresses in a word to tertiary ones. Chomsky and Halle call it the stress adjustment rule, but so that the acronym for that rule will not be confused with that of the stress anticipation rule, I take the liberty here of renaming the former rule the weakening of secondary stresses rule (WSSR).

[9] In SPE, Chomsky and Halle follow Trager and Smith in distinguishing between the accentual patterns of *condensation* and *compensation*, the latter being *còmpe̊nsátion*. They explain this difference as arising from the fact that while there is a verb *condense* underlying *condensation*, there is no verb **compense* underlying *compensation*. I question this distinction. I find that I get both *cònděnsátion* and *cònde̊nsátion* and both *còmpe̊nsátion* and *còmpěnsátion* in free variations--precisely what one would expect if the stress in question is assigned by SAR. Moreover, the formulation in SPE is totally unable to handle such examples as *àmmǔnítion*, *màstǔrbátion*, etc., and conversely the possibility of weakening in such examples as *cònde̊mnátion*, *rèfo̊rmátion*, etc., all of which are handled straightforwardly in the present account.

That the rule must be extended to anticipate other than primary stresses can be seen by considering the accentuation of such words as *ǎccèntǔátion*, *ǎntìci̊pátion*, and *ǎccéntǔàte*. In the first two examples, such an extension is needed to assign a quaternary stress on the initial syllable in anticipation of the tertiary stress on the second syllable. In the third example, the extension is needed to assign quaternary stress on the third syllable, anticipating the tertiary stress on the fourth. The need for both extensions (applicability to non-initial syllables and applicability to syllables preceding non-primary stresses) is apparent for examples like *ělèctrǒstátic* (one can also get *e̊lèctro̊státic*, of course, in fast speech).

5.0. In Section 3 we found that there is an optional rule for destressing certain syllables which receive stress from the SAR, which we henceforth shall refer to as the destressing of anticipated stress rule (DASR) and that the statement of the conditions of the applicability of DASR is tied up primarily with the phonological structure of the potentially affected syllable. One way of stating those conditions, which is perhaps the most elegant of all, involves altering the notion of weak and strong syllables from that of a binary distinction, as in SPE, to that of a scale or hierarchy of syllable strength, in which syllables ending in a lax vowel are weakest of all (this may be indicated by the specification [0 Strong]), those ending in a lax vowel plus a non-occlusive are [1 Strong], as are those which end in a non-diphthongal mid or high tense vowel, those which end in a lax vowel plus an occlusive are [2 Strong], while those which end in a diphthong or low tense vowel are [3 Strong]. We then say that ASAR assigns a stress to all syllables marked [α Strong], $\alpha > 0$, while DASR freely elminiates stress from syllables marked [1 Strong], less freely from those marked [2 Strong], and rarely, if ever, from those marked [3 Strong]. While this formulation is still incorrect in detail (it fails, for example, to handle the facts regarding *u* noted in Section 3, and it treats tense *æ* and *ɔ* alike, which is probably wrong), it nevertheless captures the basic facts regarding the SAR and the DASR.

We now examine three other destressing rules in English to see to what extent the hierarchy of syllable strength is relevant to the statement of those rules. Those rules are:

(1) a rule which destresses an ultima following a primary stressed weak (i.e. [0 Strong]) penult. We call this rule Fidelholtz's Law (FL) after its discoverer (cf. SPE, p. 146). The rule accounts for the pronunciation of *Áråb* [ǽrəb] and the non-existence of **Áràb* [ǽræ̀b], but (dialectally) *Áràb* [éːræ̀b]. The derivation of *Áråb* proceeds as follows:

Arab
0 1 MSR
1 2 ASR
1 0 FL

(2) a rule which destresses the penult of a trisyllabic word when the first syllable has primary stress; we call this rule, following Ross, the 10XR (read "ten XR") from its effect in such words as *indůstry*:

industry
0 1 MSR
1 2 ASR
1 0 10XR

(the final syllable counts as "X").

(3) a rule which destresses an ultima after ASR has applied; we already commented on this rule in Section 1 in connection with such words as *Oregon*, *adjective*. We call this the ultima destressing rule (UDR); notice that UDR applies to certain disyllabic words to which FL cannot apply, for example *óctåve*, the derivation

of which is as follows:

octave		
0	1	MSR
1	2	ASR
1	0	UDR

5.1. Unlike DSAR, FL is generally obligatory, and it appears to have few true exceptions among word ends in a consonant. Some apparent exceptions, such as ássèt, áddìct, sýnàpse, do not meet the conditions of FL, which requires that the word to which it applies contains no internal boundaries other than SPE +. Since these words contain the SPE boundary = between the Latin or Greek prefix and stem, FL is inapplicable to them. A similar explanation might be feasible for a word like léssòr, which is often pronounced with the accentuation as indicated (and according to standard dictionaries of English, must be).

Some genuine exceptions to FL, for me at least, include Híckòk, húbbùb, híccùp (híccůp is also possible), pótàsh [pátæ̀š], háshìsh. All these examples, it will be noted, consist of final syllables which begin and end with obstruents, and presumably the reason for their exceptionality is to be found there.

There are, apparently, only a very few exceptions to FL involving final syllables ending in two consonants, which might be thought of as surprising since such syllables would probably count as stronger than those which end in a single consonant. The explanation, presumably, is that a larger proportion of disyllabic words which end in a consonant cluster do not undergo ASR; that is, the primary stress is more likely to be retained on the ultima of such words. Some exceptions to FL among such words that I have found are fáscìsm, mónàrch, áddàx, and ádùlt (ASR is optional in the latter; if it is not applied we obtain ådúlt).

FL is inapplicable to words whose ultima ends in a vowel or diphthong. By a general rule, that vowel, if not reduced, must be tense, and the only final vowel which stands in phonological alternation with a reduced vowel is [o], as in *féllòw* ~ *féllo̊w* [féllə]. While one might wish to consider this a matter for FL to handle, I feel this alternation is probably more appropriately handled by a special rule which involves just final [o]. Not all such vowels freely reduce, compare *béllòw* (we do not obtain **béllo̊w*); and notice that the same alternation is found in words which are outside the domain of FL to begin with because the penult is strong, for example *wíndòw* ~ *wíndo̊w* [wíndə] and *potátò* ~ *potáto̊* [pəté:tə].

There are virtually no examples in English of words containing a primary stressed weak penult and an ultima containing a long vowel or diphthong followed by a consonant, which is to say that ASR is inapplicable (or practically so) to words of the form $C_o\breve{V}C_o\acute{\bar{V}}C_1$. This suggests that ASR is sensitive, to some extent at least, to the relative strengths of the syllables involved: the stressed syllable and the syllable to be stressed; if the latter is very weak compared with the former, ASR is not applicable. One example of this sort which I have managed to come up with is *háshìsh* [hǽšì:š], which is also strange because it contains a tense vowel tautosyllabic with a following *š*. As already noted, this word is an exception to FL too.[10]

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[10] Another example, possibly, is *Híttìte*. It might be argued that this word genuinely does contain a medial geminate, however, in light of the fact that it is more likely to be pronounced with a fully aspirated alveolar stop rather than a flap, which is the expected result of a posttonic medial *t*. *Sápphìre*, *gráphìte*, and *cáffeìne* are not examples of this sort, since the initial vowel is tense (see also footnote 3 for discussion of tense *æ* before labials). The same is true of *Ráphaèl*, *Sámuèl* when pronounced as disyllabic words.

5.2. In this section we take up the 1OXR and show among other things that it is a special case of the DASR. An excellent source of examples which illustrate the need for 1OXR are words in *-y*, such as *industry* (a derivation of which is given in Section 5.0

above), *Lombardy*, and *cuckoldry.* That the rule is sometimes inapplicable can be seen from examples like *áutòpsy* and *bíòpsy*; a fact which I believe can be only explained by noting that the syllable in question is high on the strength of hierarchy. Moreover, I believe it is the case that the 10XR rule is generally optional in those examples to which it is applicable, a consequence of the fact that the affected syllable is never a weak syllable.

An important question which has yet to be raised is how stress is assigned to the penult of trisyllabic words in the first place, and the related question of how to account for whatever stress there is on the ultima in such words as *industry*. If we compare the accentual pattern of this word with that of *Álge̊rnòn* or *Vále̊ntìne*, we find that it is essentially the same; that is, we can represent it thus: *índůstrỳ*. Now the derivation of the accentuation of, say, *Valentine* is as follows:

Valentine			
0	0	1	MSR
1	0	2	ASR
1	0	3	WSSR
1	4	3	SAR
1	0	3	DASR or 10XR

Notice that the destressing of the penult in *Valentine* can be handled either by the DASR or the 10XR, and since the former is a more general rule than the latter, we can view the 10XR rule as simply a special case of the DASR, provided the derivation of the accentuation of words like *industry* proceeds along the same lines as that of *Valentine*, i.e. as follows:

industry			
0	0	1	MSR
1	0	2	ASR
1	0	3	WSSR
1	4	3	SAR
1	0	3	DASR

If this is correct, then the accentuation of such words as *autopsy* and *biopsy* should be: *aútǒpsỳ*, *bíǒpsỳ*; and not as given above. The accentuation, however, should be *aútòpsy̌*, *bíòpsy̌*; therefore a rule whose effect is:

$$\check{V}C_1\ \grave{V}\# \rightarrow \grave{V}C_1\ \check{V}\#$$

must be added to the grammar (we call this the 4-3 switching rule (4-3SR)).

There are further reasons for assuming that the MSR assigns primary stress to the ultima of such words as *industry*--such an assignment furthermore is automatic if the vowel contained in it is given as tense;i.e. SPE *E*. First of all there are doublets such as *Gálileè* ~ *Gàlileé*, which shows that some words ending in *E* need not have the ASR applied to them at all. The suffix spelled *-ee* provides numerous examples of this sort, for example *èmplǒyeé* ~ *e̊mplóyeè*,[11] and there is also, of course, our old friend *chìmpǎnzeé* ~ *chi̊mpánzeè*.

Another argument has to do with the history of words in final *E*. Many if not most of them have entered the English language via French. It strikes me as quite reasonable that when, say, *majesty* became Anglicized, that the ASR was applied to a form accentuated as *màjěstý* yielding *májěstỳ* and ultimately *máje̊stỳ*. There is, on the other hand, no reason to assume that the word was ever accentuated with primary stress on the penult: **måjéstỳ*; and therefore I conclude that there is no reason to posit a derivation of this word in which primary stress is ever assigned to the penult.

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[11] It will be noted that the ASR assigns main stress to the first syllable of trisyllabic words in *-y* regardless of the strength of the penult (*Epóxỳ* is not a counterexample, since the final *y* in it is not the suffix *-y*), whereas it assigns main stress to strong penults of trisyllabic words in *-ee*. When the penult is weak, ASR is generally inapplicable to words in *-ee*, for example *àddrěsseé* (I have no explanation for the quaternary stress on the penult of this word, unless it is assumed that the syllable division in this word follows the morphological division--an attractive hypothesis, or at least one which is more attractive than one which assumes there to be a geminate *s* present).

If we examine words of four or more syllables, we observe that DASR does not generally apply if the syllable to be affected is preceded by an unstressed syllable. Consider, for example, the words *sécre̊tǎrỳ*, *órtho̊dǒxỳ*. The derivation of these words proceeds as follows:[12]

secretary	*orthodoxy*	
0 0 0 1	0 0 0 1	MSR
1 0 0 2	1 0 0 2	ASR
1 0 0 3	1 0 0 3	WSSR
1 0 4 3	1 0 4 3	SAR
1 0 3 4	1 0 3 4	4-3SR

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[12] In British English, however, DASR is applicable to *secretary*, resulting in *sécre̊tarỳ*, but not to *orthodoxy*. The reason is that DASR is applicable in British English to syllables preceded by an unstressed syllable only if their strength is less than 2, the same restriction which holds on DASR in other contexts in both British and American English.

5.3. In this section I attempt to show that FL is a special case of the UDR. Recall that FL states that an ultima is destressed after a primary stressed weak penult. The UDR, on the other hand, states that an ultima is destressed after a stressed strong penult or after an unstressed penult whatever its strength. Obviously the effect of the two rules is the same, and since the environments are in complementary distribution, we can conclude that the two rules are really one, unless it can be shown that some other rule must intervene between the two destressing rules, or that one is subject to a host of conditions that the other is not.

I know of no rule that must intervene between FL and UDR, so given my present knowledge, I see no objection to collapsing the rules on ordering grounds. Moreover, the sorts of words to which the UDR is not applicable are essentially the same sorts to which FL is not applicable, e.g. *mólàl* (cf. on the one hand *léssòr* and, on the other, *mólår*--*molal* was a deliberate coinage); *áardvàrk*, *tórmènt* (cf. *ádùlt* and *póte̊nt*); *Àdi̊róndàck*, *Bághdàd* (cf. *pótàsh* and *sórdi̊d*); and *mángròve* (cf. *Híttìte*). The only sorts of examples to which *UDR* is not applicable and to which FL generally is are certain words ending in short *æ* or *o* (phonetic [a]) followed by *n*, for example *nýlòn*, *Dárvòn*, *Téflòn*, *sámpàn*. Even among such words, many can be found to which UDR is applicable, e.g. *Sátån* (cf. *satanic*), *máso̊n* (cf. *masonic*). As with FL, UDR is less likely to be applicable the stronger the ultima, but for ultimas of medium strength, individual lexical items will have to be marked to indicate whether or not the rule applies.[13]

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[13] The interpretation given above in Section 5 regarding the two pronunciations of *Arab* [ǽrəb] and [é:ræ̀b], which is due to Fidelholtz, is wrong. It is not the case that the second pronunciation is due simply to the tensing of the first vowel so that the quality and tertiary stress of the (supposedly) lax ultima is retained. Rather, the second pronunciation represents a tensing of *both* vowels of the word; the [æ] of [é:ræ̀b] is the tense *æ* before labials that we discuss in footnote 3. This same phenomenon--two pronunciations of a disyllabic word with both vowels tense or both lax, with one rendering being pejorative--is found in *Negro* ([ni:gro:] ~ [nigə(r)].

When the penult is unstressed, or is weakly stressed by the SAR, then the UDR is less likely to apply. This observation parallels one made above concerning the DASR, namely its inapplicability in American English when the affected syllable is preceded by an unstressed one, and its restricted applicability in British English depending on the strength of the affected syllable. We have already given examples of this sort in Section 1, namely Oregon and adjective; UDR is optionally applicable to the first and obligatorily applicable to the second. Moreover, a rule changing the underlying I of the ultima of adjective to i must be applied. Notice that there are in fact two variants of this word, depending upon whether DASR has or has not been applied, namely ádjěcti̊ve and ádje̊cti̊ve. The derivation of this word is as follows:

adjective			
0	0	1	MSR
1	0	2	ASR
1	0	3	WSSR
1	4	3	SAR
1	0/4	3	DASR (optional)
1	0/4	0	UDR

Notice that DASR must apply before UDR. Similar examples are provided by tálǐsmån ~ táli̊smån and ómbǔdsmån ~ ómbůdsmån.[14]

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[14] I am guessing about this example. I have never actually encountered this word in ordinary conversation, having learned it through print (I even own a book on the subject of ombudsmen).

When the penult is unstressed or stressed by the SAR, the applicability of UDR depends upon two factors: the strength of the ultima and the presence of formative boundaries preceding the ultima. In the absence of such boundaries, we find that UDR is generally applicable (sometimes optionally) to [1 Strong] syllables, e.g. párågòn ~ párågo̊n, párti̊sån; often applicable to [2 Strong] ones; cf. bólshe̊vìk bólshe̊vi̊k; inapplicable to [3 Strong] ones, e.g., *pórcůpìne*, *cántålòupe*.

An intervening formative boundary can sometimes interfere with the operation of UDR; compare *Swítze̊rlånd* with *Swázi̊lànd*. The retention of the tertiary stress on the ultima of the latter shows it to be still analyzed as a compound.

5.4. We summarize this discussion of the destressing rules in English as follows: there are two general rules of destressing syllables in English, the DASR, which destresses syllables preceding stressed syllables, and the UDR, which destresses final syllables. If it were not for the fact that there is a need to order these rules with respect to each other (cf. Section 5.3), it would be possible to collapse these rules into one general one; and perhaps it is possible to get around the ordering problem by having the rule apply to successive syllables in a word from beginning to end. I shall not pursue the matter further here, however.

6. The MSR for English can be rather dramatically simplified if the foregoing account of the various destressing rules and of the ASR is correct. The rule would be to assign primary stress to the last syllable in a word whose strength is greater than zero, and if there are none, to the first syllable or the antepenult, whichever is the nearer to the end of the word. In particular, the MSR will assign primary stress to any ultima which ends in a consonant.

This formulation is not quite correct, however. Consider words of 3 or more syllables, such as *umbrélla*, *vendétta*, etc. in which both the penult and ultima are weak, but in which the penult nevertheless receives primary stress. On the basis of these examples, we find that we will have to allow the MSR to assign primary stress to weak penults in certain marked lexical items of three or more syllables. Now consider examples like *pènicíllin*, *Àrmagéddon*, *stilétto*, *Kentúcky*, *colóssus*, *solícit*, *flagéllum*, etc. If it is decided to place primary stress on the final syllables of these words, by the MSR (since the ultimas are not weak) then the ASR will be responsible for assigning the main stress to the weak penult. It would seem to me to be preferable, if at all possible, to keep the ASR out of the business of having to assign stress to weak penults, and to handle this matter solely by the MSR. In other words, we propose to allow the MSR to disregard *certain* strong ultimas ending in *E*, *O*, *V̌n*, *V̌s*, *V̌t*, and *V̌m*. I say certain ones, because, of course, the MSR must assign main stress to others which do end in the designated segments, for example *èmplǒyeé*, *Tho̊reaú*, *Àgåmémnòn*, *mo̊ráss*, *álphåbèt*, and *strátagèm*. It is possible that there are other final syllable types which can be ignored by the MSR, but I have no clear examples of any.[15]

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[15] Thus one is tempted to include *V̌k* on the basis of examples like *Habákkuk* and *Pequánnock*, but these are not clear-cut because the penults in these examples can be construed as containing tense *æ* (cf. footnote 3).

Admittedly, this radical simplification of the MSR entails some complication of the ASR, but it seems to me that the present version of the rules of English accentuation, when compared with those of SPE, lies in the direction of truth.[16]

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[16] In the present account, the MSR pays no attention to parts of speech; the ASR is however sensitive to whether a particular word is a noun, verb, adjective, preposition or whatever. For example, in the absence of any occurrences of internal boundaries, the ASR will be inapplicable to any verb ending in *rt*, for example *de̊sért* but it will be applicable to some such nouns, for example *désert* (but not all, cf. *dessért*).

Some Observations Concerning the Third Tone in Latvian*

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Some Observations Concerning the Third Tone in Latvian

Considering the importance of the Baltic languages in the study of Indo-European, it appears surprising that no extensive acoustic phonetic investigation of the suprasegmental systems of Lithuanian and Latvian has been undertaken, although these methods have been available for approximately twenty years.[1] The present study aims to offer a modest contribution to a very limited aspect of the somewhat neglected question: the acoustic realization of the so-called third tone in Latvian.

Historically, the third tone is a Latvian innovation.[2] It appears on certain long syllables; the domain of the tone is a long vowel, diphthong, or sequence of vowel plus resonant. The third tone, whose phonetic nature is hinted at by its German names "Stosston" or "gebrochene Intonation",[3] contrasts in Latvian with the acute and circumflex tones; the latter two will not be further treated in the present article. Every long syllable has one of the three tones.

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[1] Both Lithuanian and Latvian have been studied quite extensively by traditional phonetic methods. For one description of Latvian, cf. R. Ekblom, *Die lettischen Akzentarten* (Uppsala, 1933).

[2] For a recent summary of literature dealing with the third tone, cf. Vjač. V. Ivanov, "O preryvistoj intonacii v latyšskom Jazyke", *Rakstu krājums*. *Veltījums Akadēmikim Profesoram Dr. Jānim Endzelīnam viņa 85 dzīves un 65 darba gadu atcerei.* LPSR ZA Izd. (Rīga, 1959), pp. 133-148.

[3] The phonetic character of the tone is described by Ekblom (op. cit., pp. 23 ff.) as involving a steep rise in laryngeal vibrations, followed by an approximation or closure of the vocal folds (the "Stoss"), during which the amplitude of the laryngeal vibrations decreases or the vibration itself disappears. This period, also called "Umbruch" by Ekblom, is followed by a period

The Latvian third tone is frequently compared with the Danish prosodic feature called stød. Trubetzkoy, for example, contrasts long syllable nuclei with an interruption between the first and second part of the syllable nucleus with those that have no such interruption.[4] Danish and Latvian serve as illustrations of the first type.

The notion that the Danish and Latvian prosodic feature (i.e. the stød and the third tone, respectively) involves a division of the syllable nucleus into two parts is likewise supported by

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of renewed vibrations of the vocal folds, which however vibrate with a decreasing frequency. The tone is elsehwere described by Ekblom as rising-falling.

[4] N. S. Trubetzkoy, Grundzüge der Phonologie (Göttingen, 3rd ed., 1962), p. 173: "Was hier über die Sprachen mit zwei Betonungsarten der langen Silbenträger gesagt worden ist, kann auch in Bezug auf diejenigen Sprachen wiederholt werden, wo die langen Silbenträger den sogenannten "Stoss" (dänisch stød) kennen. Ob dieser "Stoss" in einem vollständigen Verschluss der Stimmritze oder nur in einer starken Verengung derselben besteht, ist unwesentlich. Wichtig ist, dass durch diese Artikulation der lange Silbenträger in zwei Teile geteilt ist. Der Umstand, dass in den betreffenden Sprachen die langen Silbenträger in solche mit einer Unterbrechung zwischen Anfangs- und Schlussteil und in solche ohne derartige Unterbrechung zerfallen, während bei den kurzen Silbenträgern dieser Gegensatz nicht besteht, zeigt deutlich, dass das Vorhandensein von Anfang und Ende als zweier gesonderter Momente in diesen Sprachen nur für die langen Silbenträger wesentlich ist. In den Sprachen, die den Gegensatz "mit Stoss - ohne Stoss" bei langen Silbenträgern kennen, erscheint derselbe Gegensatz auch bei Diphthongen und Verbindungen von "Vokal + Sonorlaut", wodurch die Zweigliedrigkeit der langen Silbenträger besonders deutlich erwiesen wird. Zu diesem Typus gehören z.B. das Dänische, das Lettische usw."

Jakobson and Halle.[5] Jakobson and Halle base their description on the analysis of the Danish stød by S. Smith.[6] However, their claim that the Latvian third tone is produced by a particular type of ballistic movement of the expiratory muscles is not supported by any references to experimental evidence.

Whatever the physiological mechanisms underlying the production of stød and the third tone, the acoustic outputs obviously have a certain degree of similarity in the two languages.[7] It appeared to be of interest to look at some acoustic realizations of the Latvian third tone and the Danish stød, and to describe the possible acoustic similarities that might underlie the perceptual similarity observed by many phoneticians.

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[5] R. Jakobson and M. Halle, *Fundamentals of Language* (s'Gravenhage, 1956), p. 24: "In the intrasyllabic variety of the stress features, the so-called *stosston* (*stød*) feature, two contiguous fractions of the stressed phoneme are compared with each other. To an even distribution of loudness throughout the phoneme, another type is opposed: the initial portion of the phoneme presents the peak of loudness, whereas in the final portion the loudness decreases. According to S. Smith's analysis of the Danish stød, the decline of amplitude, often accompanied by a decrease of the fundamental frequency, is due to an abruptly decreasing innervation of the expiratory muscles. A ballistic movement of the expiratory muscles, opposed to a more even movement, produces a similar prosodic feature, e.g. in Latvian, Lithuanian dialects and Livian."

[6] S. Smith, "Contributions to the solution of problems concerning the Danish stød", *Nordisk Tidsskrift for Tale og Stemme*, VIII (1944).

[7] This was claimed, among others, by Ekblom (op. cit., p. 50): "Dieser lettische Akzenttypus stimmt übrigens fast im Detail mit der Form des dänischen Stossakzents überein, über die ich früher berichtet habe."

In this paper, I will present first some observations regarding the phonetic realization of the third tone in Latvian, and then an informal comparison with phonetic realizations of the stød in Danish.

In the course of a study of suprasegmental features in many languages, I made a recording of 239 Latvian utterances.[8] The utterances were analyzed spectrographically at the University of Michigan, using the two Bell Telephone Laboratories' Model D spectrographs then available at The Communication Sciences Laboratory. Broad-band and narrow-band spectrograms were made of each utterance. Since a considerable number of the sentences were repeated in the course of the recording, the total number of spectrograms was approximately 600. The spectrograms were analyzed at the Linguistic Research Laboratory of The Ohio State University.

The recorded material contained 117 instances of occurrences of the third tone. In most occurrences, the third tone was manifested as a change in the phonation pattern used during the production of the syllable carrying the tone. The syllable nucleus started with normal phonation; the normally phonated part lasted for approximately half of the total duration of the syllable nucleus. This first stage was followed by a second, during which the phonation pattern changed abruptly and markedly. This stage, here called interruption, consisted either of laryngealization[9] or a glottal stop. The distinction between the two types of realizations does not appear to be categorical: intermediate realizations were also observed, which were characterized by very slow vibration of the vocal folds, reflected on spectrograms as irregularly placed spikes with considerable pauses in between. (Several types of realizations are given in Figure 1, which is described later in the text.) For the purposes of this study, an interruption was called a glottal stop, if it involved a pause with a duration of three centiseconds or more.

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[8] The Latvian utterances were compiled and produced by Dr. Valdis Zeps, a native speaker of Latvian, and recorded on July 24, 1958, at the Communication Sciences Laboratory of The University of Michigan. I would like to express my gratitude to Dr. Zeps for his contributions to the project.

[9] I use the term 'laryngealization' to refer both to irregular, slow vibrations of the vocal folds and to biphasic phonation.

The interruption was followed by a third stage, whose mode of phonation varied between regular phonation, laryngealization and voicelessness. The duration of the interruption and the third stage together was approximately as great as that of the regularly phonated first stage.

The observations are summarized in Table I. The first column of Table I gives the syllable nuclei on which the third tone appeared.[10] The second column indicates the number of occurrences of each syllable nucleus under the third tone in the test sentences. The next column gives the average duration, in centiseconds, of the syllable nucleus.[11] The next three columns give the average durations of the three stages described above, here symbolized as V_1, Interruption, and V_2. For long monophthongs, V_1 and V_2 are

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However, in this set of data, biphasic phonation occurred very rarely.

[10] The phonemic analysis implied by the selection of symbols is that used by Valdis Zeps in the transcription of the 239 utterances that constitute the analyzed corpus.

[11] These averages are somewhat smaller than those given by Ekblom (op. cit., pp. 10ff.). A possible reason is the fact that all Ekblom's test words were produced in isolation.

two stages of the same vowel; for diphthongs and vowel + resonant sequences, V_2 is either the second component of the diphthong or the resonant.[12]

The next three columns tabluate the number of times the interruption was realized as glottal stop or laryngealization.[13] It may be noted that the number of glottal stops (i.e. interruptions of 3 csec or longer) was slightly greater than the number of laryngealized realizations. The last three columns give the number of instances the second component of the syllable nucleus (i.e. the third stage) was normally phonated, laryngealized, or voiceless.

Table II presents the information contained in the last three columns of Table I in a different way. There appeared to be some regularities connected with the position of the word, on which the third tone appeared, within the larger utterance of which it constituted a part. These regularities become obvious in Table II, which shows the realization of the second component of the syllable nucleus bearing the third tone, expressed as a function of the position of the word in the sentence. In isolated words, all realizations occurred; V_2 was voiced approximately as frequently as it was voiceless. If the word with the third tone was initial in its utterance, voicing and laryngealization predominated. Voiced realizations were relatively most frequent when the word occurred in medial position. In final position, the voiceless realizations were most numerous.

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[12] Spectrographic analysis made it possible to localize the placement of the interruption: in diphthongs it occurred during the transition from the first to the second component of the diphthong, in vowel + resonant sequences between the vowel and the onset of the resonant.

[13] There were nine instances in which no interruption was observed. In six of these, the second part of the syllable nucleus was either completely laryngealized or voiceless; in one case, the whole syllable nucleus was laryngealized (the word occurred in sentence-final position). In two productions of the word [aizraʔavaʔas] (likewise in sentence-final position), the first and second syllable were produced with no apparent modification of the phonatory pattern; the final syllable contained a clearly manifested glottal stop.

The study of fundamental frequency gave less clear results. Due to the presence of laryngealization, the narrow-band filter of the spectrograph failed to resolve the acoustic signal into clearly identifiable harmonics. In those parts of the utterances that could be analyzed, it became clear that the direction of fundamental frequency movement played no part in the realization of the third tone by this speaker.

Some illustrations of the various realizations of the third tone are offered on Figure 1. This figure contains reproductions of broad-band spectrograms of seven utterances by speaker V.Z. The first row shows an isolated production of the word [laˀa̭tʃi] "bears"[14] and the same word in final position in the sentence [tʃiga·ni dan·tsina laˀa̭tʃus] "The gypsies make bears dance". In the isolated production, the interruption was realized as laryngealization; the third stage was phonated. In the sentence the interruption was produced as glottal stop, while the third stage was voiceless.

The second row contains an isolated production of the word [muˀλ̣cis] "a stupid person or thing" and the sentence [t͜seλa [malaˀa̭ guλ λaun^{t}s muˀλ̣cis] "An evil idiot lies at the side of the road". In the isolated production, the interruption was manifested as a glottal stop; the resonant was voiceless. The same realization occurred in the sentence. (Note also the realization of the third tone on the second syllable of [malaˀa̭], with three clearly distinguishable stages and regular phonation of the third stage.)

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[14] Phonetic spellings and glosses by Valdis Zeps.

The third row contains an isolated production of [saʔa̭p] "hurts" and two productions of the utterance [man gaʔɫva saˀa̭p] "I have a headache". The third tone was realized as a glottal stop in the isolated production, followed by a voiceless third stage. The glottal stop and a short voiceless stage were also present in the two sentences. The first stage of this syllable nucleus was laryngealized in both productions, probably under the influence of the falling terminal intonation. (Note also the realizations of the third tone as a brief period of laryngealization during the transition from the vowel to the resonant in both productions of [gaʔɫva].)

To recapitulate, the feature associated with more than 90% of the productions of the third tone was the change in the mode of phonation approximately in the middle of the syllable nucleus. This change was also the only constant feature. It was apparently not important whether it was realized as laryngealization or as a glottal stop. The direction of the fundamental frequency movement before and/or after the interruption appeared to be subject to the overriding influence of sentence intonation. The varying realizations of the period following the interruption seemed to depend on the position of the word within the sentence.

A considerable amount of work has been done in the analysis of the Danish stød.[15] However, most of the material published up to now is not directly comparable to the Latvian material described above. Therefore I selected some Danish materials available to me and analyzed them in the same manner.[16]

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[15] Cf. S. Smith, Stødet in dansk rigssprog (København, 1944), and K. Ringgaard, Vestjysk stød (Aarhus, 1960).

[16] The Danish materials consisted of a set of monosyllabic words and disyllabic compounds. The syllable nuclei containing the stød feature were similar to the Latvian syllables with the

The analyzed set of words contained 118 items with stød. A much greater variety of realizations was observed in the Danish words than in the production of the 117 Latvian words analyzed previously. In 8 cases, the total vocalic part of a vowel + resonant sequence was laryngealized. There were 13 cases in which the realization was similar to the prevalent Latvian pattern: a period of laryngealization inserted between the vowel and the resonant. By far the greatest number of realizations, 59 out of 118, consisted of sequences in which the vowel was normally phonated, the resonant laryngealized. There were three cases in which the laryngealization set in after the resonant had already been articulated; no such cases occurred in Latvian.

In the few test words in which the vowel was followed by an obstruent, the syllable nucleus consisted of a phonated first part and a laryngealized second part in 13 instances; a three-stage realization was observed in only 9 instances.

Figure 2 illustrates some realizations of stød. The figure contains broad-band spectrograms of six utterances produced by speaker J.R. The first row shows isolated productions of the monosyllabic words *ring* "circle" and *vej* "way" and the disyllabic compound *ringvej* "circular way". In *ring*, the stød was manifested as laryngealization of the second part of the complex syllable nucleus. In *ringvej*, the stød (appearing only on the second member of the compound) was manifested as gradual laryngealization of the whole syllable nucleus, with devoicing of its terminal part.

The second row contains isolated productions of the words *fod* "foot" and *sål* "sole" and the compound *fodsål* "sole of the foot".

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third tone, consisting mostly of sequences of vowel + resonant. The words (some of which are quoted in Danish orthography) were selected by Mr. Jørgen Rischel, a native speaker of Danish, who recorded the list of words on January 29, 1962. The spectrographic processing of the recording was carried out in the Communication Sciences Laboratory of the University of Michigan; the spectrograms were analyzed at the Linguistic Research Laboratory of the Ohio State University. I would like to express my appreciation to Dr. Rischel for his contribution.

In *fod*, stød appeared as a brief period of laryngealization at the transition from the vowel to the consonant. In the word *sål*, stød was realized in a similar way and the final resonant was fully voiced. In the compound *fodsål*, the stød appearing on the second member of the compound was realized as strong laryngealization of the second part of the vowel, encompassing also the final resonant, which was gradually devoiced.

The question is now whether the similarities or the differences between the realizations of the two prosodic features are more significant. Cross-language identification of phonological features is a question of high theoretical interest; however, it is a question that cannot be answered by techniques of acoustic phonetics. Until the two features have been found to contrast in some language, one is inclined to agree with Trubetzkoy that the phonetic details are irrelevant, as long as the first part of the syllable nucleus is contrasted with the second part. The fact that the Latvian third tone consists of three clearly identifiable stages, while the Danish stød generally consists of two stages, need not contradict this view. However, if a phonetic description of the realization of the feature is offered at all, it might as well be as close to observable facts as possible.

Table I

Realizations of the third tone on long vowels, diphthongs, and vowel + resonant sequences in Latvian.

Syllable nucleus	Number of occurrences	Average duration in csec	Average duration of			Number of instances of interruption being			Number of instances of V_2 being		
			V_1	Interruption	V_2	glottal stop	lar.	absent	Voiced	Lar.	Voiceless
i	14	16.6	7.7	4.4	4.5	9	4	1	1	5	7
e	13	19.2	8.7	5.2	5.3	5	6	2	6	3	2
æ	7	19.8	10.3	5.6	3.9	2	5	-	5	2	-
a	27	17.4	7.8	4.6	5.0	15	9	3	6	3	15
u	8	15.5	6.4	4.0	5.1	3	5	-	4	1	3
ei	4	15.0	6.5	5.0	3.5	2	-	2	-	1	1
ai	3	18.0	8.0	4.0	6.0	1	2	-	1	1	1
au	6	20.7	11.2	5.2	4.3	4	2	-	3	2	1
ia	12	14.8	7.0	4.2	3.6	5	7	-	6	3	3
ua	4	18.3	8.3	4.7	5.3	2	1	1	1	-	2
æl	8	19.7	9.9	6.3	3.5	7	1	-	1	3	4
al	4	20.1	11.0	4.8	4.3	-	4	-	3	1	-
ul	5	17.8	7.4	5.4	4.0	4	1	-	1	-	4
ir	1	15.0	9.0	4.0	2.0	1	-	-	1	-	-
ær	1	20.0	13.0	3.0	4.0	1	-	-	1	-	-
Totals and Averages	117	17.8	8.8	4.7	4.3	61	47	9	40	25	43

Table II

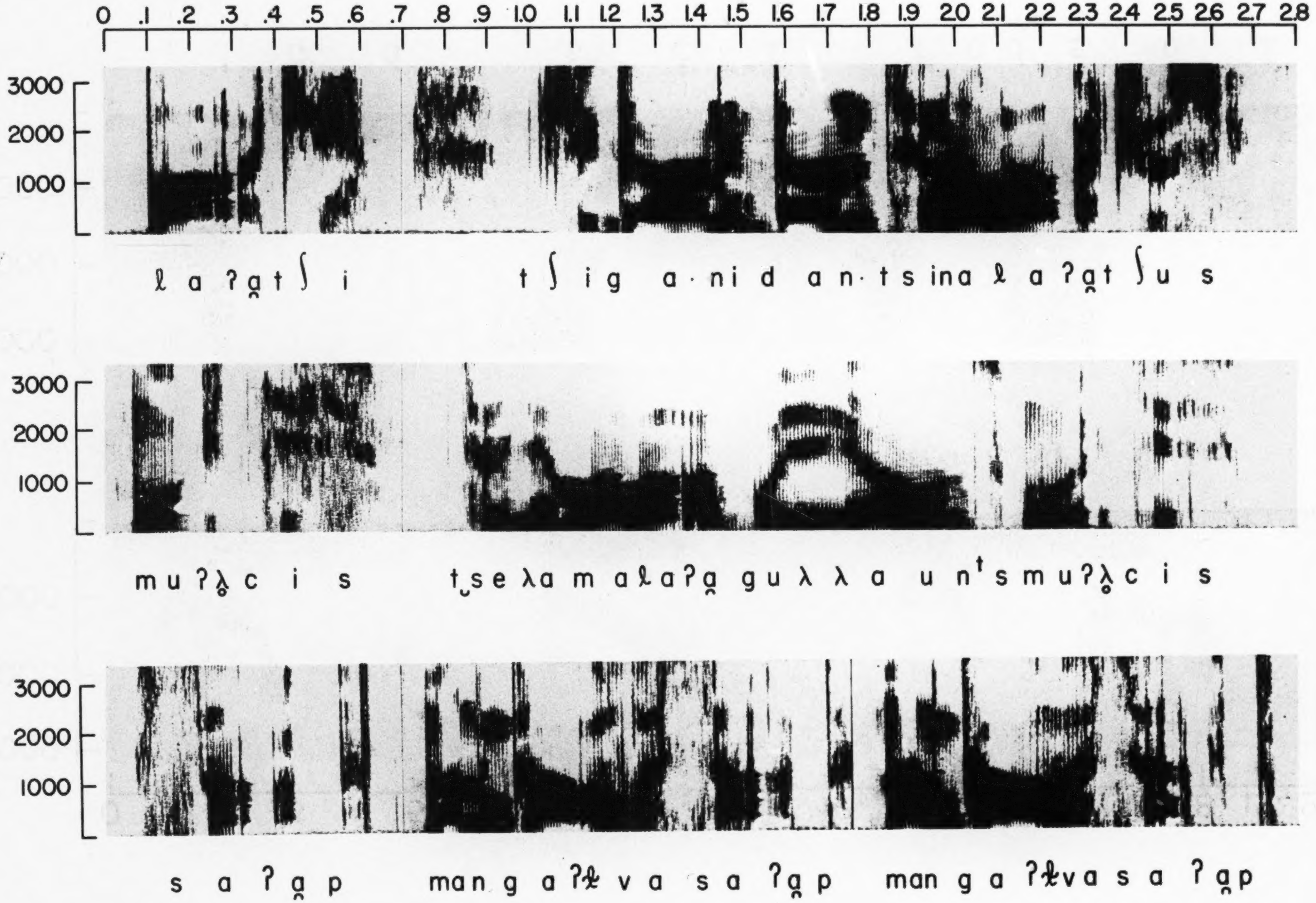
The realization of the second component of the syllable nucleus bearing the third tone, expressed as a function of the position of the word in the sentence. The numbers in the cells indicate numbers of occurrences.

Position/ Realization	Voiced	Laryngealized	Voiceless	Absent	Total
Isolated	17	5	19	4	45
Initial	5	6	2	-	13
Medial	13	6	1	1	21
Final	5	8	21	4	38
Total	40	25	43	9	117

Figure Legends

Figure 1. Broad-band spectrograms of seven Latvian utterances, produced by informant V.Z.

Figure 2. Broad-band spectrograms of six Danish utterances, produced by informant J.R.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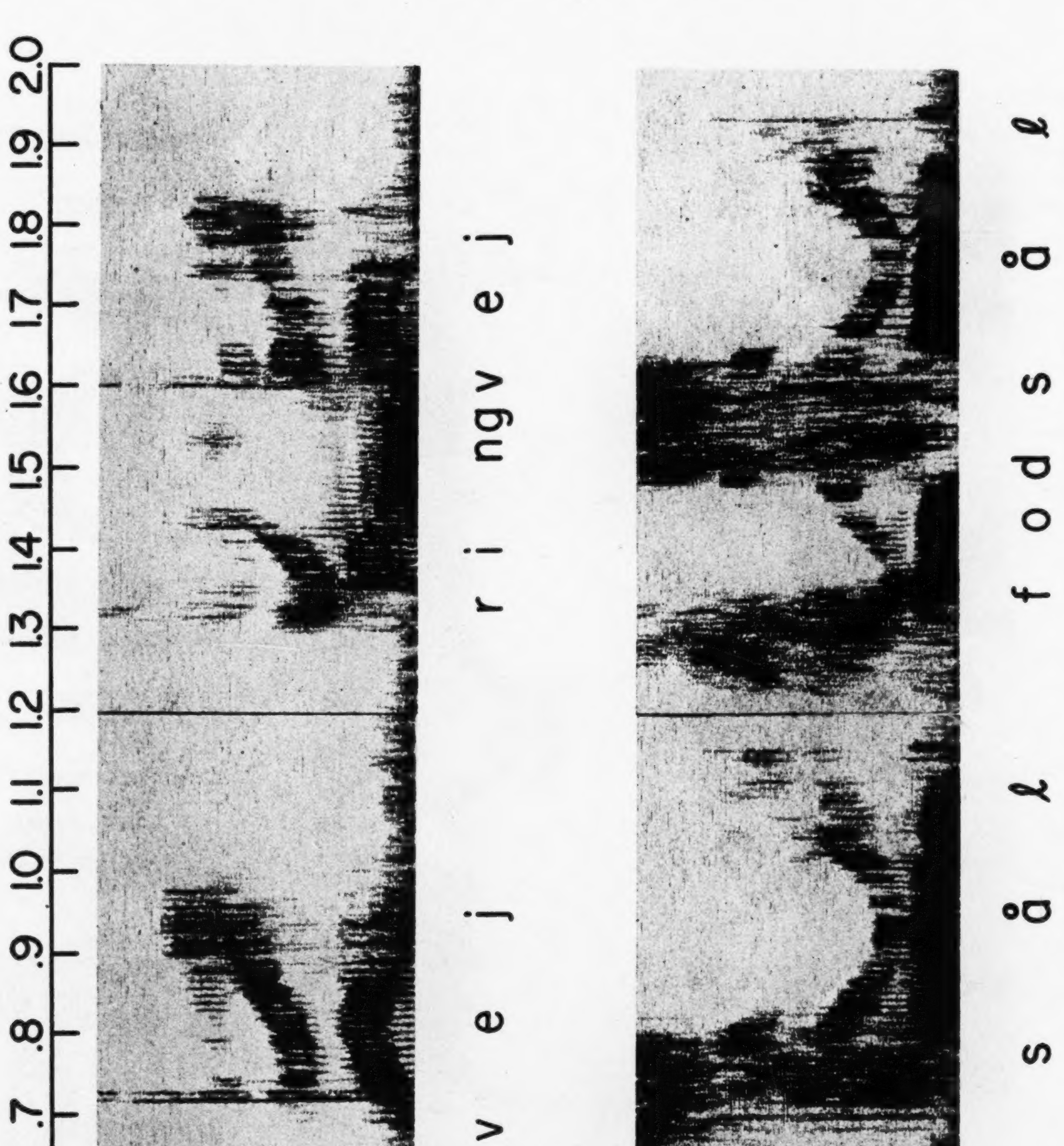
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3000
2000
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f o d s å ℓ f o d s å ℓ

On the Syntax and Semantics of English Modals*

Shuan-fan Huang

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On the Syntax and Semantics of English Modals

1. In approaching the problem of the semantics of utterances in natural languages, it seems natural to assume assertions or statements as the basic class of messages and to derive other classes from them. We then compare various types of messages with kinds of expressions found in languages and take note of points where correlation is not symmetric. We could alternatively begin with various forms of expression and study the nature of messages they convey. Finally, we can, as do Austinian philosophers, consider the use of words and note the differences between what is presupposed by the use of these words and what they can be used to assert, to order, to promise, ato accuse and so forth. A number of philosophers have tried to analyze the so-called happiness condition for the performance of certain kinds of linguistic utterances. A grammarian's job should be to figure out how illocutionary forces and happiness conditions can be related to certain lexical and syntactic properties of sentences.

Within the tradition of Aristotelian logic, sentences are dichotomized into those to which there is truth value and those to which there is none. But the truth value test is far from unambiguous. No truth value is assignable, for example, to (1) or (2):

(1) He would have been killed

(2) I ought to have read that yesterday

All imperatives and interrogatives don't have truth value, though answers to some questions, e.g. (3) or (4)

(3) Who's the author of Tropic of Cancer?

(4) Are you ready yet?

will have. An answer like

(5) He might come tomorrow

represents a point on a scale of several possible answers to the single question

(6) Will he come tomorrow?

It seems clear that the truth value test cannot even begin to be used as a means to an interesting taxonomy of utterance types.

Strawson and Searle have tried to explicate Austin's notion of illocutionary force in terms of Grice's theory of meaning. On Grice's account, a speaker S means something by an utterance Y if and only if in uttering Y the speaker S intends to achieve some effect in some hearer H and that H recognize S's intention and that this recognition will function as H's reason in a certain intended manner. Austin claims that there are "third power of ten" illocutionary forces in English. This is important to his conception of illocutionary acts. Illocutionary forces may be more or less indeterminate. Suppose I ask you to do something for me. My utterance can be a request, an entreaty or a plea. One might think of illocutionary acts as on a continuum of specificity but this would not do justice of the full complexity of the speech acts. For under the rubric "illocutionary force" are all sorts of different principles of distinctions: purposes of acts, relations between speaker and hearer, degrees of commitment and roles of acts, etc. Consider for a moment the relation between subject-person and illocutionary force by looking at some simple past statements in the third person, second person and first person:

(7) John went to the hospital this morning

(8) You went to the hospital this morning

(9) I went to the hospital this morning

Clearly (7) is most likely an assertion, with speaker's knowledge based on either direct observation or on reliable evidence. The claim for reliability in (9) is much stronger and normally should be beyond any shadow of doubt. (8) is not just an assertion; it is also likely to be an accusation. The speaker is challenging the hearer to the contrary. It obviously cannot have the force of (7) and (9), of teaching the listener something he did not know before.

The present tense involves the question of the shared knowledge of speaker and hearer. In

(10) I know that he left

"I know" signals the trustworthiness of a statement made in the best evidential conditions. It functions like adverbs or parentheticals, that is, as if it said

(11) He certainly left.

(10) therefore commits the speaker to the truth of the statement he left. It can be contradicted by

(10a) No, you don't, because he did not leave
(10b) He certainly left, but you did not know
(10c) You may have thought that he left, but you did not know

Performatives, however, cannot be contradicted without creating a bizarre communication. I consider (13) and (15) as pathological.

(12) I promise you to do it
(13) No, you don't

(14) I order you to go
(15) No, you don't.

2. Many sentences in the third person have quite different meanings from those in the first or the second, as indicated above. This is seen most clearly in modal sentences, with which this paper is centrally concerned. As discussed in logic, the notion of modality is first due to Aristotle, who argues for two basic modalities only--possibility and necessity (approximately may and must)--various others being

reducible to these two in one way or another. One thing that emerges clearly from Aristotle's discussion is that there are essential similarities among modal sentences and quantified sentences. If a sentence is *necessary*, it is true of *all possibilities*; if a sentence is *possible*, it is true of *some possibilities*; if it is impossible, it is true of *no possibility* (it is not true of *any possibility*). We may note further that the notion *necessity* may be related to *obligation* in the same sense as *impossible* is related to *prohibition*.

The English modals *can* and *may*, capable of meaning either *possibility* or *permission*, and *must* (and it negation), meaning either *necessity* or *obligation* (and *imposiibility* and *prohibition*) point up exactly these parallelisms.

The following tripartition captures the above-mentioned similarities:

A. all-some-none (quantified mode)
B. necessity-possibility-impossibility (alethic mode)
C. command-permission-prohibition (denotic mode)

Categories in C may further be thought of as results of adding to categories in B an element of *will* with regard to another person, implying that at least two persons are involved in any sentences that belong in these categories.

Aristotle was concerned with other implications, however. He developed a theory of logical relations of sentences containing such modals, a topic which has been treated ever since, but does not concern us here.[1]

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[1] Interested readers are referred for more information on this topic to (to mention but one) I. M. Bochenski, *Ancient Formal Logic*, North-Holland Publishing Company, Amsterdam, 1951.

The term modal is often applied to the closed set of auxiliaries in English consisting of can, could, may, might, must, will, would, shall, should, ought to and sometimes need (not) and dare (not). Other linguists also recognize have (got) to, be to, be able to, had better, had/would rather and one or two more.[2]

Each of Aristotle's two basic modalities can be enriched in a number of interesting ways to correspond to diverse needs of human communication. Possibility, for instance, can range all the way from mere possibility to near inescapability. Necessity may be attributed to such unrelated factors as laws of logical inference, to physical laws, to human will, or to moral obligation of all sorts. In fact, languages tend to treat logical necessity indistinguishably from physical consequences or moral obligation. Thus, in uttering

(16) John ought to do it

(17) You must open the window

it is more often than not really inescapable that John or you do it. Indeed, with ought, it is almost always the case that we fail to do it, and in present or past tense, ought in fact presupposes the falsity of predication.

(18) John ought to be here by now

(19) You ought to have been here this morning

mean that John isn't here now and that you failed to show up this morning.

Theoretically, modalities must be combinable, since we can say such things as

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[2] Long (1961, p. 138) accepts have and be as true auxiliaries, but regards the modals as full verbs capable of taking sentential objects. Joos (1964) admits the modals partly on the basis of their behavior with respect to do and partly on semantic grounds. Diver (1964) includes keep and used to but excludes dare and need.

(20) It must be the case that he can do it

(21) It may turn out that John will have to go

In English, however, modals are mutually exclusive, at least those that are most readily accepted as true modals. Thus

(22) *must can

(23) *dare (not) will

(24) *must be to

(25) *ought to must

(26) *may must, etc.,

are never permitted.

Let me quickly name some of the major characteristics of English modals before going on to a somewhat more detailed examination of their syntax and semantics. The first characteristic of a modal is that under negation, the negative particle not follows the modal; in contrast, a non-modal verb, when negated, calls for do-support and the particle not is then attached to the auxiliary do. The following are impossible in English:

(27) *I like not John

(28) *we saw not him

Secondly, the inversion transformation obtains for modals under interrogation or after the negative preverbs such as scarcely, seldom, never, hardly, etc. Thus

(29) Will they be there?

(30) Ought we to ask them?

(31) Seldom can they see the light.

Third, modals can only occur initially in a verb phrase, a characteristic that is shared by no other verbs in English. Thus whereas

(32) I want to begin.

(33) I begin to want.

(34) I ought to begin.

are O.K.,

(35) *I begin to ought.

(36) *I want to ought.

are definitely out. This characteristic seems to be correlated with the total lack of selection restrictions on the part of English modals. For every sentence in the language, it is possible to create a modal sentence by the simple process of putting a modal, with appropriate sense inflections, before the main verb. From

(37) John is reading a book

comes

(38) John may be reading a book.

From

(39) The table is red

we get

(40) The table may be red.

The addition of modals in no way affects the grammaticality, nor the selectional restrictions of the original sentences, which are taken intact from the deep structure. Fourth, all modals, including such morphologically past tense forms as _could_, _might_, _should_, _would_ may refer to the future and may co-occur with future time adverbials. There is, for instance, no time difference in the following:

(41) He may go tomorrow--He might go tomorrow

(42) I shall ask him--I should ask him

(43) Can you help?--Could you help?

In indirect discourse, only past tense forms are used, of course. But _must_, _ought to_, (and _dare_, _need_) don't change even in indirect discourse.

Fifth, sentences containing modals passivize across both infinitive and preceding verbals, which is not the case with other complement-taking verbs (with the exception of a small class of intransitive verbs; _seem_, _happen_, _appear_, etc.) like _want_, _avoid_, _expect_, _endeavor_, _like_, etc.

(44) John may see Mary

is passivized across to

(45) Mary may be seen by John

and the meaning is preserved. But

(46) John expects to see Mary

and its passive

(47) Mary expects to be seen by John

are completely different in meaning.

Returning now to how English implements modals to effect the idea of *possibility*, we note that among modals expressing *possibility* of various shades, *can* and *may* are most deserving of attention. Since *could* and *might*, morphologically their past tense forms, are chiefly used in a tentative sense to make less positive statements or more polite requests, and semantically are not too distinct from *can* and *may*, what I have to say below concerning the latter will also be applicable to the former, unless otherwise specified.

One sense of *can* is concerned with ability, of whatever type. In this sense, it is not used with future time adverbials to refer to the future; future time is indicated by *will be able to*; *could* refers to past time.

(48) When he is older, he can run a mile

is odd, but

(49) When he was young, he could run a mile

is well-formed.

Can also expresses feasibility or the absence of anything to prevent from occurring. It is replaceable by *may* and can refer to the future. But *can* in this sense is not replaceable by *may* in questions. (50) is not the same as (51).

(50) Can he be hiding?

(51) May he be hiding?

The past time analogue of feasibility *can* is *can have*, not *could*. Contrast (52) and (53)

(52) He can be hiding.

(53) He can have been hiding.

where the difference is only in time. In (54)

(54) He could be hiding

the idea of feasibility is much less positive. There is no difference in time.

In negative sentences and interrogatives, can appears where may would be likely or almost certain in the corresponding affirmative sentences:

(55) He can't have left: He may have left.

(56) These figures can't be right: These figures may be right.

(57) Who can that be?: That may be John.

In He can't have left, the idea of possibility is present in time (it isn't possible) and the idea of leaving is past (that he has left). With can, there is a contrast between (58) and (59).

(58) You can't go

(59) You can not go (do what you please: you can go or you not go)

Here can't negates the ability (or permission) to act; can not positively states ability (or permission) not to act.

May, like can, is a full predicate word expressing possibility of various types. Most often it expresses a kind of possibility that involves uncertainty on the part of the speaker, much as the adverb perhaps does. May is used with reference to both present and future; may have is the past time analogue; might is used in a tentative possibility sense.

May is also used to give permission; reference may be to the present or future time. There is no past time analogue (why?); might is available only as, again, the analogous tentative form in request-questions (might he go?). (60) in the permission sense is ruled out.

(60) *You might go

In interrogatives, may is confined to the permission sense. The question corresponding to (61) will employ some such locution as (62).

(61) He may (possibility) go home

(62) Is there a possibility of his going home?

The may which recognizes uncertainty is not negated. In (63)

(63) You may not like it

there is no negating of may--what is negated is the following infinitive, like. Permissive may can be negated, as in (64).

(64) Cars may not park here.

The two senses of may and the different scopes of not intersect to yield logically four possible interpretations to a simple sentence like (65).

(65) He may not read that.

It is, however, only two-way ambiguous between (66) and (67)

(66) He is not allowed to read that

(67) It is possible that he'll not read that.

Where defective may seems inadequate for the purpose at hand, other locutions can come to the rescue: there is a chance, it is possible, it is permitted, it is allowed, etc.

Sentences containing stative verbs or adjectivals like (68)

(68) John may (permission) be tall

may seem to be odd. Under different circumstances, it would be perfectly natural. The sentence

(69) They agreed that in the play John might be tall but Mary had to be short.

is impeccable. Similarly, sentences containing non-human subject and adjectivals like (70)

(70) The answers may (permission) be correct.

may be rejected at first glance. Embedding it to another sentence, we obtain a well-formed sentence.

(71) It would be incredible for a teacher to tell students that the answers may be correct

or may be wrong.[3]

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[3] Since it may be the semantic content of a sentence embedded at n^{th} depth or conjoined at n^{th} branching which determines the ultimate acceptability of the entire complex sentence, it poses a serious problem to current theory of selectional restrictions which appears to have no way of handling selectional restrictions across sentence boundaries.

Must is used in English to indicate a conclusion or a high degree of certainty. _Must have_ is the past time analogue and _can't_ its negation:

(72) There must be a hundred people here.
(73) There must have been a hundred people here.
(74) There can't be a hundred people here.

Unlike _may_, _must_ is never negated. When _not_ follows _must_, and even when it's merged with _must_ in _musn't_, what is negated is the following infinitive, not _must_ itself. A sentence like (75)

(75) John must not know the answer.

is consequently only two-ways ambiguous:

(76) It must be the case that John does not know the answer
(77) It is necessary that John does not know the answer.

The conclusive _must_ is not used in interrogatives so that, for example, the tag for (78) is often (79).

(78) You must be out of your mind
(79) Aren't you?

Similarly, (80) is ill-formed.

(80) *Must you be out of your mind?

Will is of course treated in traditional grammar as above anything else the marker of future tense, along with _shall_. More commonly, _will_ suggests willingness or agreement. It is formally distinguished from the future _will_ in that in this sense _will_ can occur in conditional clauses:

(81) If he'll come tomorrow, the matter will soon be settled.

Analogous to *may* and *must*, a similar ambiguity obtains for *will*, most commonly in negation.

(82) John will not confess his crime

is ambiguous:

(83) It will not happen that John will confess his crime

(84) John refuses (will not agree) to confess his crime.

Again, the ambiguity can also be sought in differences in the scope of the particle *not*. In (83) it is the infinitive *confess*, and in (84) the modal itself that is being denied.

Of the modals that express the idea of necessity or obligation (= moral necessity) in various degrees, we can recognize *must* and *ought to* (*should*).

Must expresses a degree of constraint that is felt as too strong to permit escape--necessity, in other words. In this sense, it may refer to the future; its analogous past time is *had to* and its negation *needn't* (or *don't have to*):

(85) I must go now.

(86) I had to go then.

(87) I needn't go now.

Analogous to permissive *may*, the conclusive *must* is not interrogated. The question corresponding to (88) would be something like (89).

(88) He must be an engineer

(89) Are you sure he is an engineer?

Also parallel to *may* is the fact that sentences containing *must* can be shown to be systematically ambiguous; those that are not readily apparent are in fact so under different circumstances.

Should and *ought*, no longer felt as inflected forms of *shall* and *owe*, are now used to express a degree of constraint that is felt as escapable, as pointed out earlier. Their past time analogies are should have and ought to have; their negations are shouldn't and needn't respectively. Contrast should and the colloquial have to.

(90) I have to study tonight.

(90) implies that no escape from the task is in sight. Escape may later be found, but this is another matter. (91) implies that escape from the task is quite possible.

(91) I should study tonight.

(92) implies that no escape was found and (93) implies that escape was actually found.

(92) I had to study last night.
(93) I should have studied last night.

Ought has a much narrower range of meaning than should and it always leaves open the possibility of non-action, while must does not. We may thus attest:

(94) He ought to go, but he won't.
(95) *He must go, but he won't.

Like musn't, oughtn't is the negative form of ought only morphologically. Logical negation of both must (obligation) and ought is needn't. Compare (96)-(99).

(96) I must go, but John needn't.
(97) Must I go? No, you needn't.
(98) I ought to go, but John needn't.
(99) Ought I to go? No, you needn't.

Semantically, mustn't and oughtn't do not negate the obligation to act, but express a positive obligation not to act. We may thus contrast (100)-(102) and (103)-(105).

(100) You must go.
(101) You needn't go.
(102) You mustn't go.
(103) You ought to go.
(104) You needn't go.
(105) You ought not to go.

This distinction can't be made with all other modals; we can't with will, for instance, differentiate between denying the futurity of acting and stating the futurity of non-acting.

Be to expresses a kind of constraint that grows out of arrangement, stipulation and expectation of various kinds. It is often a polite substitute for the more direct have to or the more brutal must.

In summary, we can observe that in contrast with non-modal verbs in which past tense forms and those that are used in indirect discourse are not distinct, English modals have the complication that not all the past tense forms are used simply to refer to past time. The past time analogies vary for one simple modal in its various meanings and are certainly not always the past tense forms. A further complication is that not all modals have past tense forms, chiefly because they refer to future time or express logical necessity. In considering what the past time analogies are for each modal, we note three possibilities:

(a) past time reference is made with all of the modals in one of their senses with have, e.g.,

(106) He can have been at home yesterday. (possibility)
(107) He may have come last week. (possibility)
(108) They must have done it then. (certainty)
(109) You ought to have come with us yesterday. (desirability)

(b) for some of the senses, the past time analogue seems to be past tense plus have:

(110) He would have done that for you. (volition)
(111) He could have gone. (permission)
(112) I could have done that if you had asked. (willingness)

But these forms are generally referring to events that failed to happen.

(c) _must_ has entirely different verbs as past time analogies:

(113) John _must_ go (now).

(114) John _had to_ go then.

(115) John _must have_ gone.

3. This section will be devoted to the problem of how modals are to be introduced and represented in the deep structure and to a discussion of the syntactic properties of modals in general terms. My point of departure will be Ross's paper, "Auxiliaries as main verbs," where he first argues that all Aux's belong to the same major category as true verbs and are to be introduced into the deep structure the same way other verbs are and that there is no Aux constituent in the deep structure. I assume in the absence of _counterarguments_ that Ross's arguments are conclusively established. In the following, although I will be basing my discussion largely on the evidence from the "neutral" modal _may_, it will be easy to extrapolate and extend my arguments, if valid, to be generally applicable to all modals. The arguments presented below for the subject-embedding _may_, for instance, apply to the conclusive _must_ and those for the _may_ which takes a sentential complement also seem to apply to the necessity _must_.

We begin by observing that permissive _may_, when used as a performative, may be a true verb which has a first person subject, as in (116),

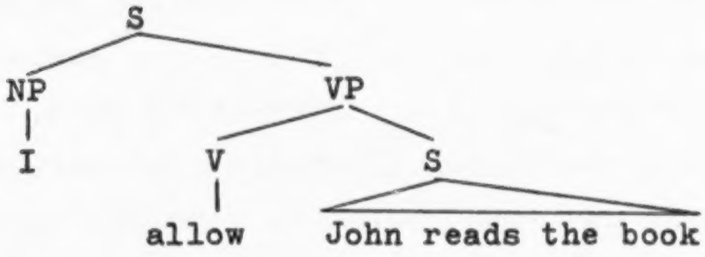
(116) John may read the book.

or unspecified subject as in (117).

(117) Cars may not park in this lot.

The deep structure of (116) would roughly be something like the following:[4]

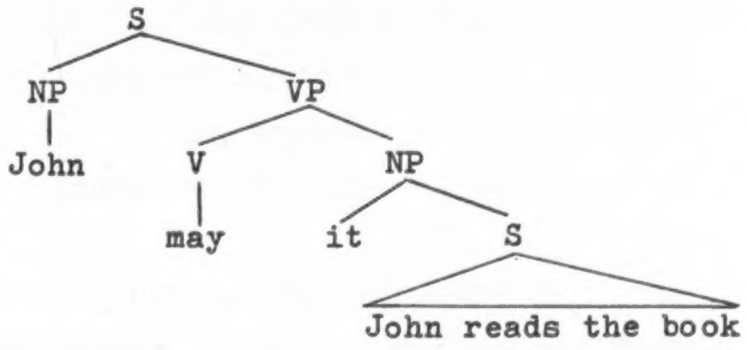
(118)



Lexical substitution rule(s) will consult the DS, substitute may for the portion of tree dominating I allow (the details of which are not known to me); The Flip transformation then applies obligatorily to produce the correct surface form of (116).

An alternative, but much less plausible DS for (116) could be something like (119)

(119)



and Equi-NP deletion applies to the complement sentence to produce the correct surface form. A DS like this, being

---

[4] I leave open the question whether the deep structure in (118) is in fact the correct one or (116) is actually an instance of NP complementation. It may be noted, however, that (116) may well be an instance of VP complementation since the pseudo-cleft sentence is impossible:

*What I allow John is that John reads the book.

or

*What John may is to read the book.

bound up too much with the surface representation, seems to be wrong on two counts: (1) it assigns falsely a transitive reading to *may*; and (2) it fails to capture the fact that underlyingly *may* is a performative verb.

Note the switch of agents from active to passive sentences involving *may* (and modals in general): while in (120) the agent is the speaker, its active counterpart (121) implies that the agent is anything but the speaker.

(120) John may be examined by me.
(121) I may examine John.

Below are a class of simple *may*-sentences containing all three persons. On the right is exhibited the switch of persons involved. Matrix agent is the person giving the permission and constituent agent is equivalent to the embedding subject.

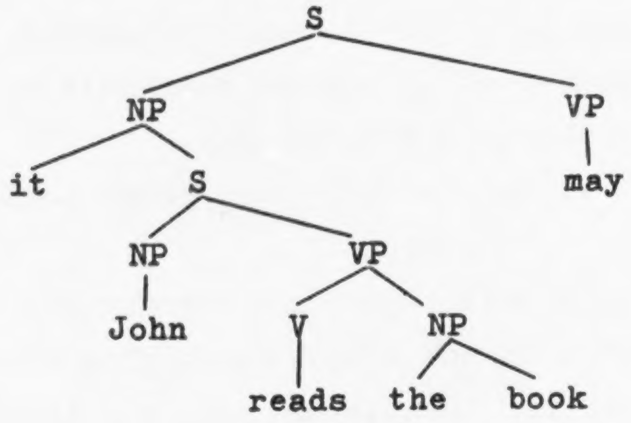
		Matrix Agent	Constituent Agent
(122)	I may examine John.	He	I
(123)	?John may be examined by me.	I	I
(124)	You may examine John.	I	you
(125)	John may be examined by you.	I	you
(126)	Mary may examine John.	I	Mary
(127)	John may be examined by Mary.	I	Mary
(128)	I may examine you.	He	I
(129)	?You may be examined by me.	I	I
(130)	You may examine me.	I	you
(131)	I may be examined by you.	I	you
(132)	John may examine me.	I	John
(133)	I may be examined by John.	I	John

One thing that emerges clearly from the above comparison is that the second person *you* can never appear as matrix agent. Also the whole range of sentences containing all possible combinations of persons show that there is a constraint in English to the effect that no matrix agent can be identical to a constituent agent. These sentences are marked with a question mark above.

May in the possibility sense might be an intransitive verb like *seem*, *appear*, *happen*, *etc.*, so that the DS of (134) would be something like (135),

(134) John may read the book.

(135)



with the subject NP *John* being substituted for *it* by *It*-replacement and the rest of the embedded sentence being moved to the right and brought under the domination of the matrix VP yielding the correct surface form of (134).

It has been noted that the possibility *may* is never negated. A sentence like (136) is paraphrasable with (137) but not with (138).

(136) John may not read the book.

(137) It is possible that John will not read the book.

(138) It is not possible that John will read the book.

This characteristic of allowing only unidirectional negation is not to be found in verbs like *seem*, *happen*, *appear*, since (139) has the paraphrase (140) or (141).

(139) John seems not to be reading the book.

(140) It seems that John is not reading the book.

(141) It does not seem that John is reading the book.

There may be no explanation for the fact that only the embedded VP can be negated, given a DS like (135). Other seemingly unexplainable facts with regard to the possibility *may* are (142) and (143).

(142) it is never interrogated

(143) it is hardly passivized.

A DS like (135) in which *it* appears might be objected to on the ground that *it* is not a meaning-bearing element. Note, however, the presence of *it* may be available to account for sentences like (144) in a simpler way.

(144) It may be (the case) that John will read the book.

May, like *seem*, etc., does not permit the sentential subject to be moved to the front and topicalized, indicating that the extraposition transformation is obligatory for this class of verbs.

(145) *That John will read the book $\left\{\begin{matrix}\text{may}\\ \text{seem}\\ \text{appear}\\ \text{happen}\end{matrix}\right\}$.

If the matrix VP node is further expanded, we get the grammatical sentence (144) to (146).

(146) It may be strange that John will read the book.

Sentences (144) and (146) can be pseudo-clefted since the NP subject contains a sentence (147).

(147) What may be the case is that John will read the book.

and (148)

(148) What may be strange is that John will read the book.

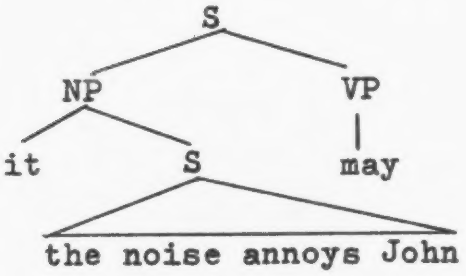
Consider now a pair of related sentences like (149) and (150).

(149) The noise may annoy John.

(150) John may be annoyed by the noise.

This pair of sentences are synonymous. If their DS is something like (151),

(151)



it can account for the synonymy of (152) and (153) (and hence (149) and (150)). Since the only difference between (149) and (150) is that the passive transformation has applied in the embedded sentence of (150) but not in (149).

(152) It may be that the noise will annoy John.

(153) It may be that John will be annoyed by the noise.

If, on therother hand, *may* is a verb like *condescend*, taking a sentential complement or a transitive verb like *want* taking a sentential object, we would expect (149) to exhibit some difference in meaning since the deep subject of (149) would be *noise*; that of (150) would be *John*.

This concludes my discussion of the syntax of the English modals. There are several problems I've not addressed myself to. I've not committed myself to an explanation, for instance, of why the permissive *may* is greatly weakened under the passive transformation, if it is possible at all. One may explain this by saying that the passive takes place in the complement sentence of the modal. In the case of possibility *may*, which has a DS like (118), the new subject is simply raised to give the passive surface form. The permissive *may* must, however, undergo lexical substitution rules and the Flip transformation. Since the idea of permission is difficult to associate with the object of the embedded sentence, the passive sentence, thus produced, is strange in this reading.

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